

We have an all-hands now to discuss the events.
God Bless your efforts, Lawrence

At 05:55 PM 2/2/2003 -0500, Pete Rutledge wrote:
SMA Directors,

As you may know, Bryan O'Connor is the Ex-Officio member of the CAIB. Your help is needed. Bryan has asked that each of you think about what you would ask if you were on the CAIB. What issues would you want to investigate? You should e-mail your suggested questions or issues for investigation to Bryan (he has his laptop with him) and me; I will post the collection of questions/issues on the STS-107 PBMA work group site at:

<http://107team.intranets.com/login.asp?link=>

If you have not yet been invited to join this site, please let me know and I'll get an invitation sent to you.

Thanks,

Pete

Peter J. Rutledge, Ph.D.
Director, Enterprise Safety and Mission Assurance Division
Acting Director, Review and Assessment Division
Office of Safety and Mission Assurance
NASA Headquarters, Code QE, Washington, DC 20546

ph: 202-358-0579
FAX:202-358-2778
e-mail: pete.rutledge@hq.nasa.gov

Mission Success Starts with Safety!

Peter J. Rutledge, Ph.D.
Director, Enterprise Safety and Mission Assurance Division
Acting Director, Review and Assessment Division
Office of Safety and Mission Assurance
NASA Headquarters, Code QE, Washington, DC 20546

ph: 202-358-0579
FAX:202-358-2778
e-mail: pete.rutledge@hq.nasa.gov

Camomilli-1, Guy, 08:01 AM 2/7/2003 -0500, RE: FW: updated version of the general guidelines for fi

FAX (202) 358-3104

"Mission Success Starts with Safety"



Guidelines for the Collection 3.doc

X-Sender: jlloyd@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Thu, 06 Feb 2003 18:44:33 -0500
To: prichard@hq.nasa.gov
From: James Lloyd <jlloyd@hq.nasa.gov>
Subject: Fwd: Really Qualified Volunteers (RQVs)
Cc: boconnor@mail.hq.nasa.gov

Pam,

Additional voluntary effort suggested for the support of the Board should they so choose.

Date: Thu, 06 Feb 2003 14:04:48 -0500
From: '
Subject: Really Qualified Volunteers (RQVs)
To: "jlloyd@hq.nasa.gov" <jlloyd@hq.nasa.gov>
X-Mailer: Internet Mail Service (5.5.2655.55)

Jim: Rather than shoot off some errant darts, I want to let you know the some RQV friends of mine would be very helpful in the investigation and follow on to the COLUMBIA tragedy. If you think I should have them send more formal offers, please let me know.

- highly qualified -- twice Commander of the Naval Safety Center, now working at Battelle Memorial Institute (with access to tons of super technology capabilities at Battelle)

Former Chairman of the NTSB (during Bush I); currently with Fulbright & Jaworski; former Marine pilot; aviation specialist.

NTSB Investigator in Charge (IIC) -- led the ValuJet investigation and many others in 20 years at NTSB. Now a consultant based in Colorado.

If there is anything I can personally do, I will be glad to work with you or anyone else to get to the bottom of this. My strengths are in technology, and systems safety.

PS - NTSB nomination moving forward; but it may be a few weeks before a hearing.

Jim

X-Sender: fchandle@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Fri, 07 Feb 2003 09:51:11 -0500
To: HCAT@hq.nasa.gov
From: Faith Chandler <fchandle@hq.nasa.gov>
Subject: Offer of investigation assistance
Cc: prichard@hq.nasa.gov

An offer of assistance to the Columbia investigation.
See below.

X-Sender: fad@mail.acc-inv.com
X-Mailer: QUALCOMM Windows Eudora Version 5.1
Date: Fri, 07 Feb 2003 07:46:53 -0700
To: fchandle@mail.hq.nasa.gov
From:
Subject: Columbia Investigation

FAITH:

Please add _____ to the list for consideration as a potential investigation team member. Credentials and background are listed below:

_____ is a registered Professional Electrical Engineer. He has a Degree in Electrical Engineering from the University of Utah. He is also a Certified Crime Scene Investigator. He has conducted hundreds of accident investigations for over the past forty years, and has taught thousands of people the principles of accident investigation and mishap analysis.

_____ is currently the director of the System Safety Development Center (SSDC); a continuation of the SSDC established by the Atomic Energy Commission (AEC). The SSDC has developed and taught the principles of accident investigation to The AEC, IAEC, DOE, DOE Contractors, NASA, OSHA, MSHA, NTSB, other governmental agencies, and industry in the United States and other countries. The SSDC developed the investigation techniques of MORT Charting, Fault Tree Analysis, Barrier Analysis, Change Analysis, Events and Causal Factors Charting, and Root Cause Analysis. The SSDC has been the leader in causal factor determination and corrective action implementation for over three decades.

System Safety Development Center

E-Mail _____
Web _____

Faith Chandler

NASA Headquarters
Office of Safety and Mission Assurance
Code Q Rm 5x40
300 E Street, S.W
Washington, D.C 20546

202-358-0411

202-358-2778 (fax)

Thomas Whitmeyer, 09:00 AM 2/10/2003 -0500, Offer to Help PRA on TPS

X-Sender: twhitmey@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Mon, 10 Feb 2003 09:00:44 -0500
To: prichard@hq.nasa.gov
From: Thomas Whitmeyer <Tom.Whitmeyer@hq.nasa.gov>
Subject: Offer to Help PRA on TPS

Pam

Please include this offer with the list that goes to Bryan

From: "Kuper, Robert J [AMSTA-AR-QAW]" <robert.kuper@us.army.mil>
To: "Tom.Whitmeyer@hq.nasa.gov" <Tom.Whitmeyer@hq.nasa.gov>
Subject: URGENT Info
Date: Wed, 5 Feb 2003 14:40:34 -0500
X-Mailer: Internet Mail Service (5.5.2653.19)

Tom,

I was in the process of discussing the agenda and elements of knowledge for the NASA tech transfer activity, as well as also putting together a package for the Associate Administrator, Mr. Bryon O'Connor (which he requested last week at the RAMS conference in TAMPA) with a colleague of mine. While doing that we came across a startling element of critical information you need to be aware of.

First a little background: I have been a strong proponent for the extensive application of Probabilistic Design work, Probabilistic Risk Assessment (PRA) Strategies, and the application of Probabilistics to all sorts of high risk decision making opportunities (all of which i plan to discuss at CQSDI). The bottomline is that i am convinced the entire technical and business community has neglected, due to lack of serious understanding "HOW" to apply, one of the most critical technology applications ever. That being the diverse applications of Probabilistics for all decision making processes. When done properly, (and very few do) we can leverage the goodness of both deterministic and statistical methods and significantly empower it with probabilistic applications to reduce and control uncertainty to such a significant degree that we can make very high risk decisions properly. This can result in significantly better designs, significantly shorter cycle times, and profound cost savings over the acquisition and life cycle of all programs. And, we can do that with the advantages of the optimal design and modeling of the decision process (be they physics-based, qualitative; based on DOEs; experimental/deterministic, statistical, expert and/or qualitative types of data; and all the associated factors of cycle time, acquisition or life cycle cost etc... so its always

an optimized best case solution when done properly.

My goal, in this small, but crucial area of my ATRIP program, is to educate the entire Army Life cycle community and our Industrial Base on this and put applications into practice immediately, on all programs, and grow it through the success stories at an ever-increasing rate. The problem is that it is not simple to educate people on, and it requires some rather intelligent folks to design the problems and work the solutions. There is NO short cuts for doing it right. And, because it requires a unique capability it has not easily caught on and propagated thru the community, as with other tools, where there is ease of implementation. Regardless of that, i plan to succeed with it. SAE-G-11, Probabilistic Methods Committee is working to do that and i plan to join their leadership committee to make it happen. Infact i want to also start a Probabilistics Subcommittee on Armaments and Munitions within TACOM this year and will petition SAE shortly.

NASA and your Industrial Base have used it quite well in some areas. I recognized that at CQSDI last year and in the workshops there. But also in working with some of your past contractors from Rockwell and Boeing for the past 15 years.

Now the important stuff:

Today, i had a telecon with the premier Probabilistic company (in my estimation), PredictionProbe, Inc. In discussing things for tech transfer and to include into Bryon O'Connors package he requested during his talk in the Advisory Panel entitled "What We Do Know and What We Don't Know". There-in he was looking for advise on approaches for both the Mid Life Shuttle addressing the O&S Phases, as well as focus areas for the Crew Transport Vehicle challenges. He too indicated the critical need for the use of PRA and Bayesian updating etc...and wanted to build on design assurance approaches.

In talking to _____ at Prediction Probe Inc., He stated that he developed the Probabilistic tools and methods during his work at Rockwell and then Boeing for NASA. He did many studies on the Shuttle using probabilistics in a physics-based design tool environment. One of the studies/models of critical need for you guys today is the one he did on determining the Debris size and resultant crater sizes and critical crater/crack analyses for the heat tiles and underbody structures. He said it addressed exactly what is being hypothesized and the models could predict the probabilities of catastrophic failure at re-entry under any set of defined conditions. He used a Probabilistic and Bayesian modeling approach for Damage Accumulation for various hypothetical debris sizes and calculates among many things the crack sizes and their probabilities, and then many many other applications like modeling accuracy of other models being used, analysis accuracy, error accuracy, etc... The models were further used to design certain experiments and then the data acquired validated model predictions etc.....

He said he would gladly come down with me to brief you and your boss, Mr O'Connor and whomever you believe needs to see this. Perhaps Dr Greenfield and those on the failure investigations. He further indicated he has advanced the tools such that he could help show that perhaps the analyses used to determine if reentry was a risk, and at what levels of risk they really were versus what the models ultimately used were saying. Which can then replicate the possible mechanisms of failure. He can also help you develop an updated system to assure such risks can be better evaluated in the future, and should there be a similar occurrence, how to use it to decide upon reentry thru a validated risk model.

PLEASE let me know if we can help you on this. I will drop things and get down there immediately. I will have him on contract in the not too distant future so his accessibility will be there if you needed that. It looks like the tools and verifiable ability to determine if the debris and crater hypothesis is a candidate failure mechanism that needs to be studied in greater depth.

BEST REGARDS,

Tom Whitmeyer
Manager, Agency Quality Program
NASA Headquarters
Office of Safety and Mission Assurance
Code QS
Ph: 202 358-2228 Fax: 202 358-3104

X-Sender: fchandle@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Tue, 11 Feb 2003 10:23:22 -0500
To: HCAT@hq.nasa.gov
From: Faith Chandler <fchandle@hq.nasa.gov>
Subject: Fwd: FW: Columbia Investigation
Cc: prichard@hq.nasa.gov

HCAT,

See note below: A suggestion that Cognitech may have some capability to assist in the forensic analysis of video.

Mike Jones is a former NTSB accident investigator.

From: "Jones, Mike" <MEJones@comdt.uscg.mil>
To: "Faith Chandler (E-mail)" <fchandle@hq.nasa.gov>
Subject: FW: Columbia Investigation
Date: Tue, 11 Feb 2003 10:04:27 -0500
Importance: high
X-Mailer: Internet Mail Service (5.5.2653.19)

Faith,

How are efforts going to enhance video of the Columbia breakup? I know someone who may be able to help. _____ of Integradyn, Inc., has worked with the astronaut office in Houston for 4 years and knew and worked closely with Rick Husband. I've also known Aerospace Experimental Psychologist CDR _____ USN Retired, since coming to Washington. Please read below:

Regards,

-----Original Message-----

From:
Sent: Monday, February 10, 2003 9:06 AM
To: Jones, Mike
Subject: Columbia Investigation

Mike,

I have a good friend -- _____ -- who is CEO of a small company that specializes in forensic analysis of video. The company is Cognitech

Attached is an example of a tutorial from their website. Note the pictures on the last two pages. They illustrate the kind of powerful results that can be achieved from _____ sophisticated tools.

I firmly believe that Cognitech could add significantly to the Columbia Investigation by applying their techniques to several of the launch and entry videos.

If you happen to have a discussion with your contact at NASA/HQ, it would be a significant service to add Cognitech to the mix.

I have probably told you about _____ before, but if not --

He's a Russian Jew who immigrated to US, got his PhD at Caltech. He was a crypto officer in the Red Army before immigrating.

_____ was the guy who ID'd the perps who beat Reginald Denny during the LA riots after the Rodney King incident. He deblurred the video tape of the beating, and found a tato on one of the perps. The guy confessed when shown the picture of him beating Denny.

_____ also did analysis on a home movie of the B-52 crash up in Wash. State some years ago. And he did work for the Navy on the F-14 ramp strike by a female pilot.

Cognitech has several DoD and CIA clients, but they are not currently doing anything for NASA.

Anyway, if you get a chance to make the suggestion, I believe Lenny is the right guy to deblur the launch video. NASA's current efforts -- based on averaging of 10 frames -- is guaranteed to obscure any damage. The attached pdf illustrates one alternative that Lenny can bring to bear.

/steve



License Plate Tutorial.pdf

Faith Chandler

NASA Headquarters
Office of Safety and Mission Assurance
Code Q Rm 5x40
300 E Street, S.W
Washington, D.C 20546

202-358-0411
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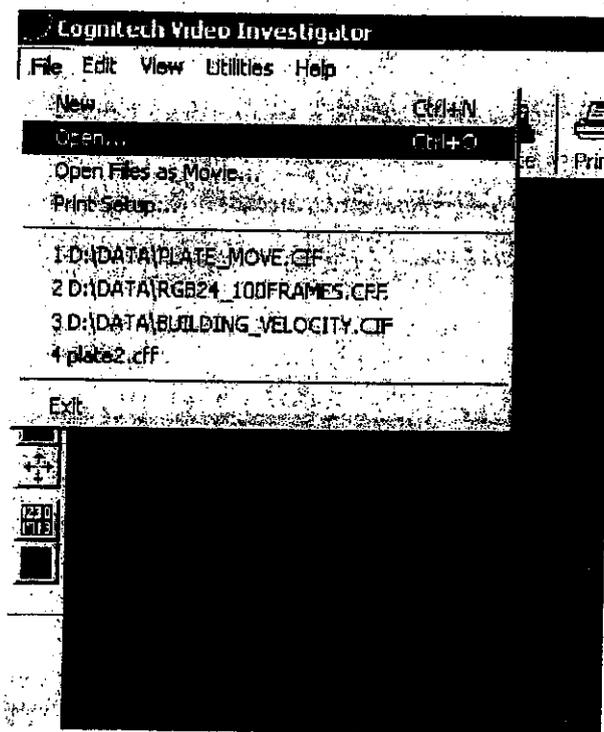
Faith Chandler, 10:23 AM 2/11/2003 -0500, Fwd: FW: Columbia Investigation

Tutorials

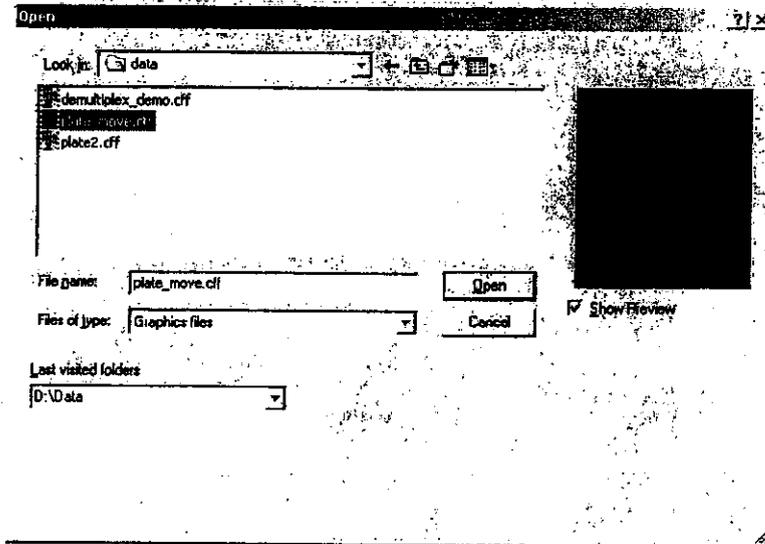
License Plate Mosaic

This tutorial explains how to use Velocity and Mosaic Reconstruction to combine a movie's frames with incomplete information into a single frame that combines all of the information of a particular object in a the frame, across all of the frames where the object appears.

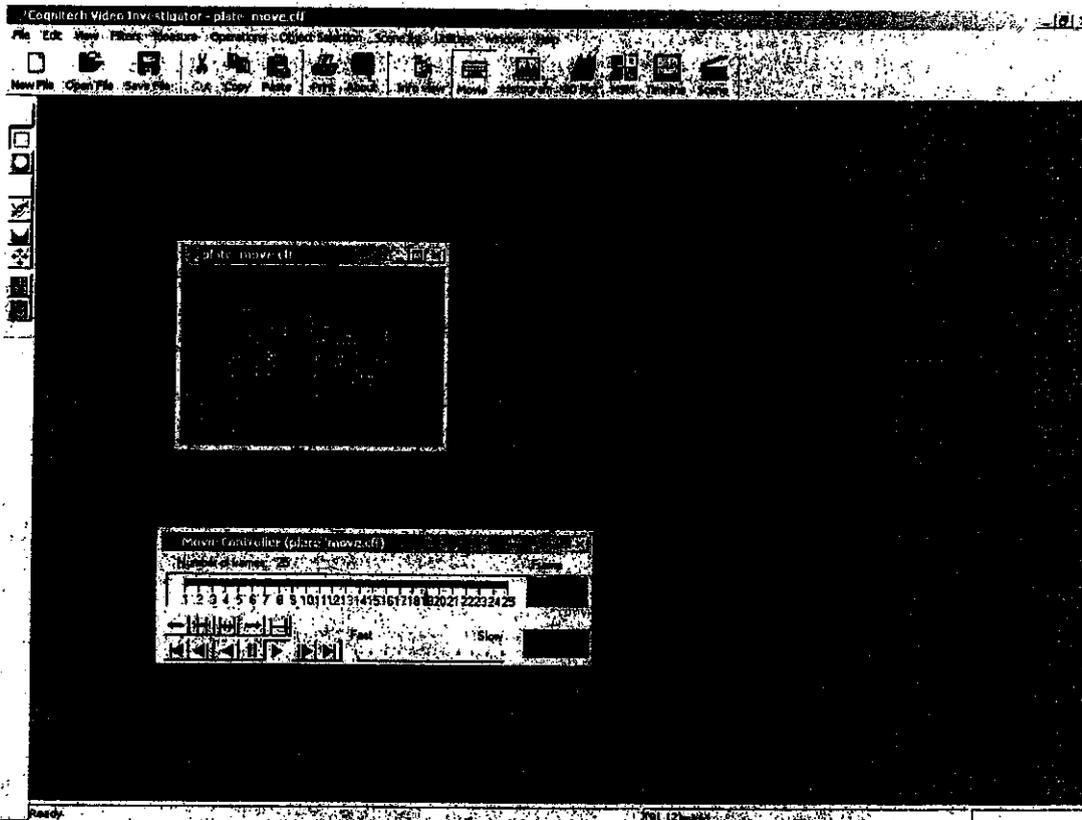
The data used is the plate_movie.cif file that shipped with Video Investigator version 1.0. It can be found on the CD-ROM, under the Data directory. Open this movie in Video Investigator. First launch Video Investigator, then click File->Open.



Move to the CD-ROM drive, go into the Data directory, and double-click on plate_movie.cif.



The movie should look like this:



This file contains a movie of a car license plate taken from a darkened parking garage. As you can see, no single frame of this movie contains readable information. But, all of the frames combined could give us a readable image.

There is some movement in the movie. Video Investigator comes with a series of Filters that can track the velocity of objects in movies. We need to compute this movie's velocity before merging the frames, so that the reconstruction filters know which objects from one frame are similar to objects in the next frame.

On the left side of Video Investigator's screen is a toolbar, which looks like this:



The last image  is the Glyph Tool. Click on it.

The Glyph Tools toolbar will appear below the main toolbar:

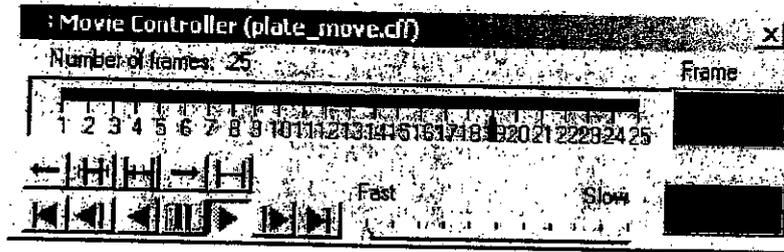


Glyph Rectangle Tool

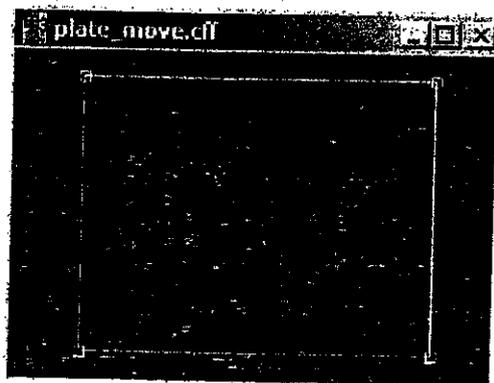
The fifth icon from the top of this toolbar is the Rectangle Glyph Tool. Click on it.

Glyphs are a method of selection that is frame dependent, but are time and space aware. Each frame of a movie can have different selections, using Glyphs. We need to isolate the important area of our movie using the Rectangle Glyph tool.

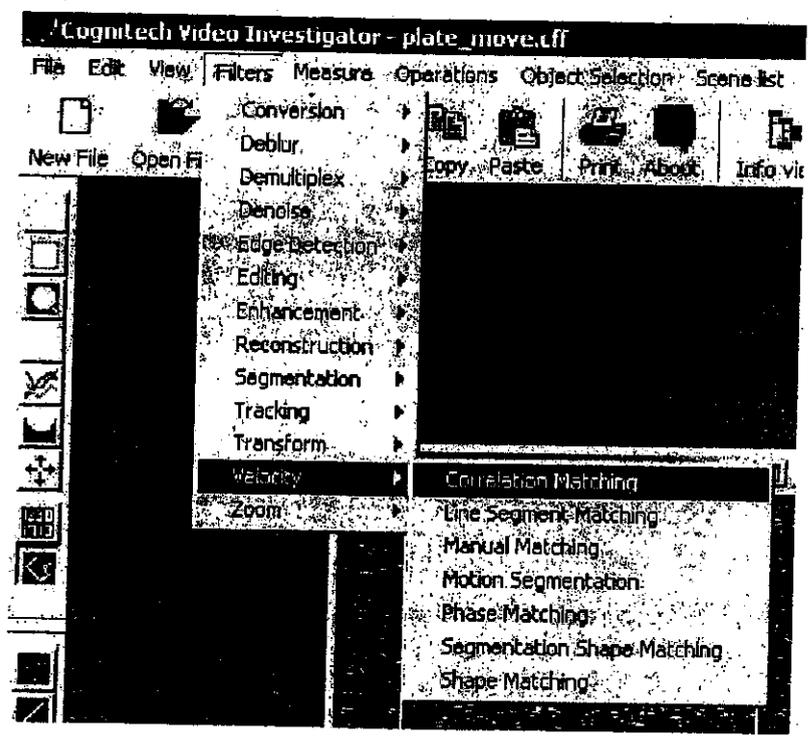
First, pause the movie from the Movie Controller. Then, drag the frame indicator to frame 1 of the movie, or rewind the movie.



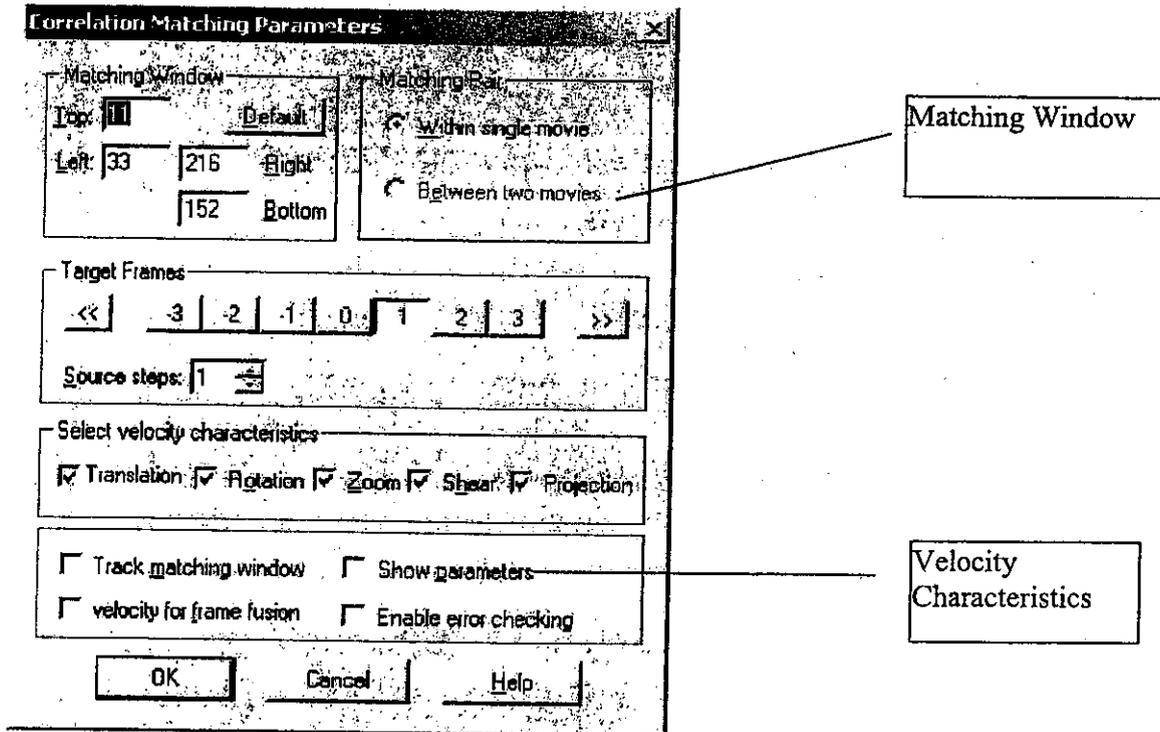
Starting at the upper left part of the license plate, hold down the left mouse button and drag to the lower left corner of the license plate.



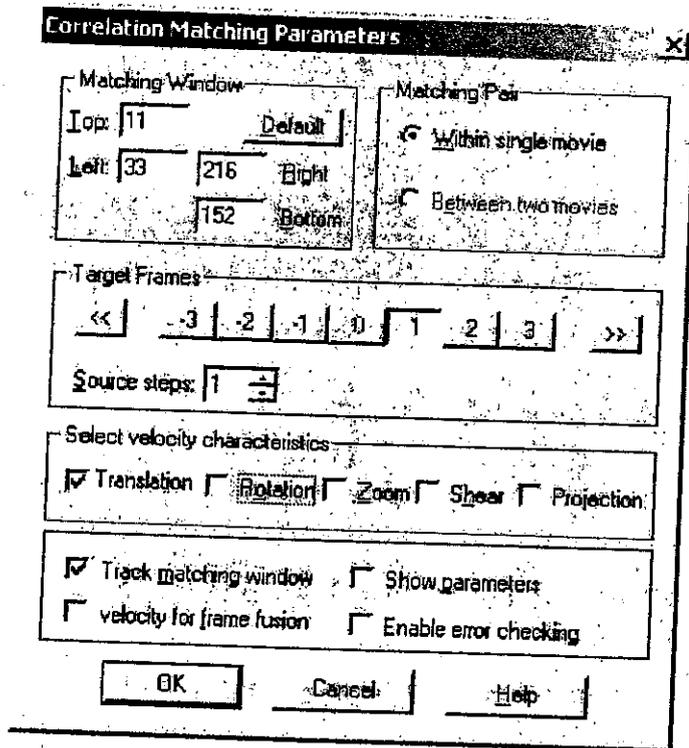
Now go to Filters>Velocity>Correlation Matching



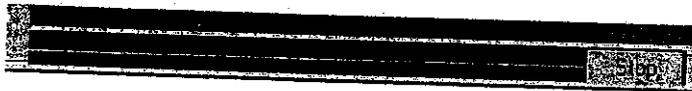
Other filters can be chosen as well, see the Users Manual for information on the Velocity Filters. The following dialog box should appear:



These are the parameters that the Correlation Matching Filter needs in order to operate. The first change we need to make is to click the "Track Matching Window" box. This will take our Glyph Rectangle and move it according to the movement of the objects within the rectangle. Next, the Velocity Characteristics need to be all un-checked. There is little to no rotation, zoom, shear, or projection in this movie, and so we do not need to complicate matters by having the Filter adjust for such occurrences. Your modified parameters should look like this:

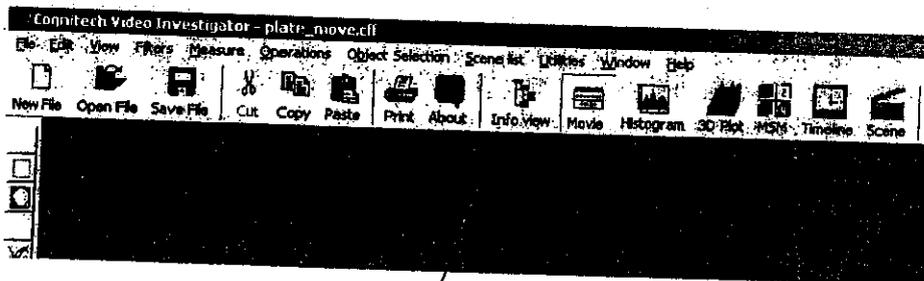


Click OK to start estimating velocity. The progress bar in the lower left corner indicated the progress of the filter.



When the filter is done, the progress bar will disappear.

After the filter is done processing, click on the Component Information Viewer. This is located at the top of the screen.

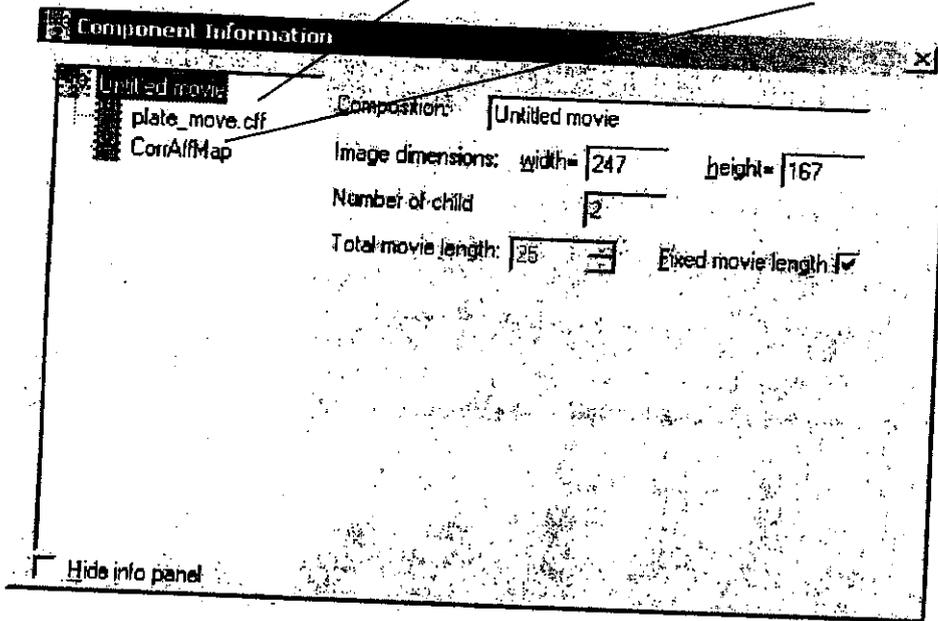


Component Information Viewer

This window will appear within Investigator. It shows the components of this movie. As you can see, the movie now contains two components. The first is the actual image data. The second, "CorrAffMap", is the velocity information. This is not a viewable component, but merely a data structure filled with affine velocity information which allows for translation, rotation, zoom and shear.

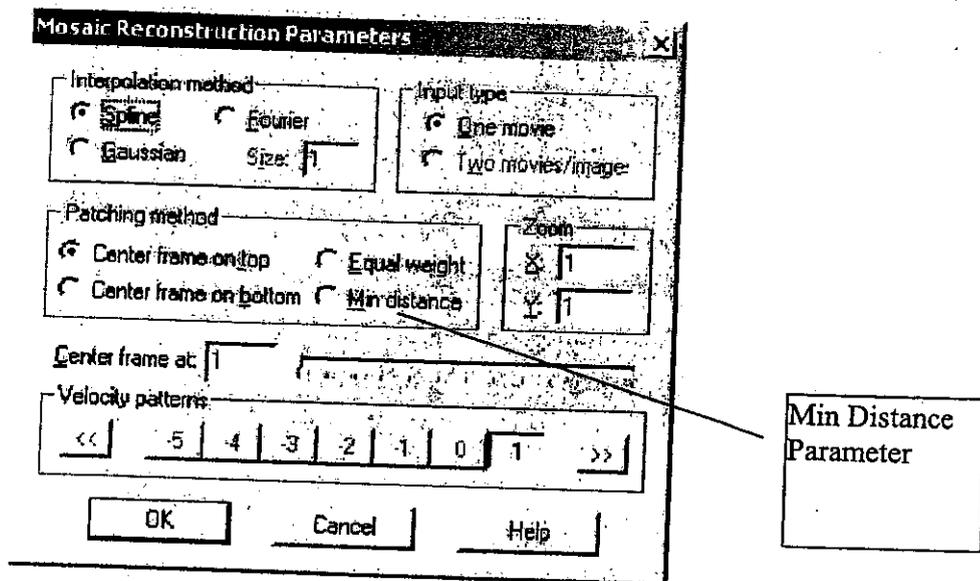
Image Data

Velocity Information



Now that we have confirmed that our velocity is contained within our movie, we can begin to reconstruct a single frame containing all of the information of the entire movie.

Go to Filters->Reconstruction->Mosaic Reconstruction.



Here, we can change the Patching Method to Min Distance. Then select OK. Note that Equal Weight can be chosen as well. The Min Distance will combine frames preferentially with larger weights depending on time distance from the center frame, in this example Frame 1. Equal Weight will combine all frames with equal weight.

Again, the progress bar will appear in the corner, and also a new image will appear in Investigator. This new image, named "Mosaic Construction" is where the output of the Mosaic filter is placed. As the filter processes, you can see more and more information enter into the "Mosaic Construction" image. When the filter finishes, you should end up with a constructed image similar to this:

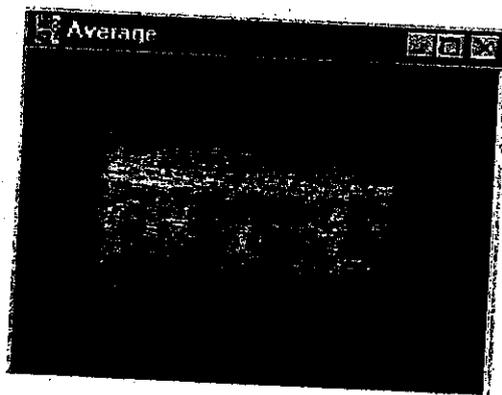


The license plate reads 3UXC915. More processing could be done on this image to further enhance it, if needed.

As a counter-example, the traditional method of attaining this information is by a process called "Averaging Frames". As the name implies, this technique takes all the information in a movie, and applies mathematical averaging from one frame to the next to produce a

final averaged image. Video Investigator supports this technique. You can find this filter under Filters->Simple Operation->Average.

Run it on the original movie, and you end up with this output:



As you can see, computing the velocity and using the Mosaic method gives you a far superior output.

X-Sender: prutledg@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Wed, 12 Feb 2003 09:17:11 -0500
To: prichard@hq.nasa.gov
From: Pete Rutledge <prutledg@hq.nasa.gov>
Subject: Fwd: FW: Volunteer List
Cc: cheryl.a.inman@nasa.gov

Pam,

Here's another offer of assistance to add to our volunteer list for Bryan.

Pete

From: "INMAN, CHERYL A. (JSC-NA) (NASA)" <cheryl.a.inman@nasa.gov>
To: "Hopson, Pat" <phopson@ems.jsc.nasa.gov>,
"prutledg@mail.hq.nasa.gov" <prutledg@mail.hq.nasa.gov>
Subject: FW: Volunteer List
Date: Tue, 11 Feb 2003 16:17:17 -0600
X-Mailer: Internet Mail Service (5.5.2653.19)

> -----Original Message-----

> From:

> Sent: Wednesday, February 05, 2003 4:30 PM

> To:

> Cc:

> Subject: Special Skills (Fault Tree Analysis) for STS-107

>

> Bob,

>

> When I was a younger pup, I started my career out in the safety world
> doing safety, and more specifically, fault tree analysis for the post
> Challenger safety analyses (not the Challenger investigation itself
> though). I was employed by Boeing at the time. During today's Columbia
> update, Dittmore mentioned that they were performing a fault tree
> analysis. (My first reaction was "Why? It's already been done"). Back in
> the day, we wallpapered the offices with a fairly comprehensive set of
> fault tree printouts on the entire shuttle program. I spent nearly three
> years in this effort. I don't know of anyone else involved in this effort
> that is still in the local community either. So, I consider myself to have
> some unique expertise in this area.

>

> If an extra body is needed, I would be willing and honored to help.

> Contact me at any time at the following :

>

>

>

>

> _____ (probably your best bet)
personal e-mail: _____

-----Original Message-----

From: ADAMS, TIMOTHY C. (X500)
Sent: Tuesday, February 04, 2003 10:02 AM
To: MARSHALL, YOLANDA Y. (JSC-NA) (NASA); ERMINGER, MARK D. (JSC-NC) (NASA)
Subject: Offer for help

Feel free to call me if I can be any assistance or a resource. You know plenty much some things I can do.

Since JSC, I have a comprehensive and current release of updated reliability software by Relex. Also, I have a tool that analyses data "visually" up to five dimensions simo (3 axes, colored points, and different diameter for the plotted points) and does not use formulas or calculations--the only input it needs is data from an Excel spreadsheet.

Feel free to contact me anytime.

Regards,

Tim

Tim C. Adams

NASA Kennedy Space Center
Headquarters, Mail Code QA-C
Kennedy Space Center FL 32899

321-867-2267 (Office)

321-867-9504 (Fax)

From: VENSKI, STEPHEN A. (JSC-NT) (NASA)
Sent: Monday, February 10, 2003 10:04 AM
To: MARSHALL, YOLANDA Y. (JSC-NA) (NASA)
Subject: RE: Thank You

Director Marshall,

I don't know if you've compiled a list, but there are quite a few of us in the Directorate who have aircraft/crash investigation/explosive ordnance experience, who will volunteer to assist our folks currently in the field. I have twenty years of aircraft maintenance experience, along with crash investigation, and would pack my bags in an instant to deploy to the field if our folks need relief, or additional personnel to assist in the recovery effort.

Thank You.
Respectfully,

Steve Venski
NASA QA
Mission Control Center

Thanks!
Cheryl A. Inman, x32385
SR&QA/NA
Bldg 45/Room 514

"The secret to life is not what happens to you, but what you do with what happens to you"---Norman Vincent Peale

Peter J. Rutledge, Ph.D.
Director, Enterprise Safety and Mission Assurance Division
Acting Director, Review and Assessment Division
Office of Safety and Mission Assurance
NASA Headquarters, Code QE, Washington, DC 20546

ph: 202-358-0579
FAX:202-358-2778
e-mail: pete.rutledge@hq.nasa.gov

Mission Success Starts with Safety!

Jonathan B. Mullin, 04:14 PM 2/18/2003 -0500, Fwd: Fw: Columbia follow-up

X-Sender: jmullin@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Tue, 18 Feb 2003 16:14:20 -0500
To: jlloyd@hq.nasa.gov
From: "Jonathan B. Mullin" <jmullin@hq.nasa.gov>
Subject: Fwd: Fw: Columbia follow-up
Cc: jlemke@hq.nasa.gov, wfrazier@hq.nasa.gov

thought you might pass this note on. It comes from [redacted] at Vandenberg. I am sure that the board is considering all of the possibilities. This note is a bit stale as it was sent to my home computer, and [redacted] is using it most of the time. Regards, Jon

Sent: Sunday, February 02, 2003 9:36 AM
Subject: Columbia follow-up

Jon,

I've heard word of debris striking wing on ascent. If they are not already lending some focus to that, consider the "build-paper trail" for that particular ET and go for the foam mixing ratios, mix times and cure times, etc. If you recall the Delta failure in 98 at the Cape, the investigation got to the build-paper for the GEM cases at their manufacturing point; records showed the resins had been cured within spec, but at the upper/lower end of the spec, and coupled with other specs in the mixing, temperature, set-time, etc., the result was a cured product that was more brittle than expected. When the GEM ignited, and "perhaps - not proven, I recall - due to a small flaw in the fibers, the GEM ruptured lengthwise.

It could be a similar situation in that at that point where a shift-change occurred and mix working time was shakey, but someone thought the foam was still workable and application continued, resulting in a less-than-adequate bond and hence a large piece could have been easily dislodged. This would require investigation to see if somehow, somewhere, sometime, an individual made a decision to cut-a-corner to save time or \$, instead of meeting the requirement.

Note I am not saying this is the smoking gun, but this concept is what the Fault Tree Analysis would prove or de-bunk.

Michelle Laufer (working in SES since the late 80s and with Rockwell before that) called me yesterday morning "offering" to support any investigation that might be initiated. I think that goes for all of us.

Bye for now, and good sailing. Try to keep those folks on-track.

Mike
Jonathan B. Mullin
Manager Operational Safety

Jonathan B. Mullin, 04:14 PM 2/18/2003 -0500, Fwd: Fw: Columbia follow-up

Emergency Preparedness Coordinator
Headquarters National Aeronautics and Space Administration
Phone (202) 358-0589
FAX (202) 358-3104
"Mission Success Starts with Safety"

Jonathan B. Mullin, 12:42 PM 2/19/2003 -0500, Re: Fwd: Fw: Columbia follow-up

X-Sender: jmullin@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Wed, 19 Feb 2003 12:42:04 -0500
To: Pamela Richardson <prichard@hq.nasa.gov>
From: "Jonathan B. Mullin" <jmullin@hq.nasa.gov>
Subject: Re: Fwd: Fw: Columbia follow-up

Here is [redacted] email, [redacted] for the record. I think [redacted] may have some good points on the ET tank materials as it extrapolates from the GEM on the Delta. Regards, Jon

At 12:28 PM 2/19/2003 -0500, you wrote:
Jon --

At this point, I am not leaning toward putting this person and Michelle in our "offers of assistance," since as you say this is from 2/2 and may be fairly stale. If you have had further correspondence with either of them, an e-mail address with a name would be required to put it in our database.

Thanks, Pam

At 04:14 PM 2/18/2003 -0500, you wrote:

Jim, thought you might pass this note on. It comes from [redacted] at Vandenberg. I am sure that the board is considering all of the possibilities. This note is a bit stale as it was sent to my home computer, and Barb is using it most of the time. Regards, Jon

Sent: Sunday, February 02, 2003 9:36 AM
Subject: Columbia follow-up

Jon,

I've heard word of debris striking wing on ascent. If they are not already lending some focus to that, consider the "build-paper trail" for that particular ET and go for the foam mixing ratios, mix times and cure times, etc. If you recall the Delta failure in 98 at the Cape, the investigation got to the build-paper for the GEM cases at their manufacturing point; records showed the resins had been cured within spec, but at the upper/lower end of the spec, and coupled with other specs in the mixing, temperature, set-time, etc., the result was a cured product that was more brittle than expected. When the GEM ignited, and "perhaps - not proven, I recall - due to a small flaw in the fibers, the GEM ruptured lengthwise.

It could be a similar situation in that at that point where a shift-change occurred and mix working time was shakey, but someone thought the foam was still workable and application continued, resulting in a less-than-adequate bond and hence a large piece could have been easily dislodged. This would require investigation to see if somehow, somewhere, sometime, an individual

made a decision to cut-a-corner to save time or \$, instead of meeting the requirement.

Note I am not saying this is the smoking gun, but this concept is what the Fault Tree Analysis would prove or de-bunk.

working in SES since the late 80s and with Rockwell before that) called me yesterday morning "offering" to support any investigation that might be initiated. I think that goes for all of us.

Bye for now, and good sailing. Try to keep those folks on-track.

Mike

Jonathan B. Mullin
Manager Operational Safety
Emergency Preparedness Coordinator
Headquarters National Aeronautics and Space Administration
Phone (202) 358-0589
FAX (202) 358-3104
"Mission Success Starts with Safety"

Pamela F. Richardson
Aerospace Technology Mission Assurance Manager
Enterprise Safety and Mission Assurance Division, Code QE
Office of Safety and Mission Assurance, NASA Headquarters
300 E. Street, S. W., Washington, DC 20546
phone: 202-358-4631, fax: 202-358-2778

"The meek can *have* the Earth. The rest of us are going to the stars." --- Robert Heinlein
"We have to learn to manage information and its flow. If we don't, it will all end up in turbulence." --- RADM Grace Hopper

Jonathan B. Mullin
Manager Operational Safety
Emergency Preparedness Coordinator
Headquarters National Aeronautics and Space Administration
Phone (202) 358-0589
FAX (202) 358-3104
"Mission Success Starts with Safety"

Vernon W Wessel, 04:12 PM 2/12/2003 -0500, GRC STS-107 Mishap Investigation Capabilities

X-Info: ODIN / NASA Glenn Research Center
X-Sender: rqwess@popserve.grc.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 5.1.1
Date: Wed, 12 Feb 2003 16:12:35 -0500
To: prichard@hq.nasa.gov
From: Vernon W Wessel <Vernon.W.Wessel@nasa.gov>
Subject: GRC STS-107 Mishap Investigation Capabilities
Cc: prutledg@hq.nasa.gov, james.d.lloyd@hq.nasa.gov, dmoore@hq.nasa.gov

Hello Pam,

Attached is the GRC STS-107 Mishap Investigation capability summary providing POCs for technical skills and facilities at GRC that could be of help during the investigation. I believe you are the supporting them being communicated to Bryan and the PBMA web site.

Thank You,
Bill

Vernon W.(Bill) Wessel
Director, Safety and Assurance Technologies Directorate

National Aeronautics and Space Administration
John H. Glenn Research Center
Mail Stop: 3-6
21000 Brookpark Road
Cleveland, Ohio 44135

Phone: (216) 433-2350
FAX: (216) 977-7005
E-Mail: Vernon.W.Wessel@grc.nasa.gov

Mission Success Starts With Safety



capability.doc

GRC STS-107 Support Capability

Capability	Individual	Phone Number
	Technical Skills	
High Temperature Materials	Hugh Gray	(216) 433-3230
Aerospace Power Research	Valerie Lyons	(216) 433-5970
Advanced Propulsion Research	Valerie Lyons	(216) 433-5970
Vehicle Health Management	John Lytle	(216) 433-3213
Instrumentation, Sensors, & Electronics	John Lytle	(216) 433-3213
Icing Research	D. R. Reddy	(216) 433-8133
Communication Technology	Dan Williams	(216) 433-3500
Combustion Technology	D. R. Reddy	(216) 433-8133
Propellant Systems Technology	D. R. Reddy	(216) 433-8133
Computational Fluid Dynamics	D. R. Reddy	(216) 433-8133
Structures	Dennis Huff	(216) 433-3913
Aircraft Operations	Bill Rieke*	(216) 433-2036
Legal Counsel	Bill Sikora*	(216) 433-2318
Space Communication Projects	Sina Javidi	(216) 433-8326
Space Transportation Projects	Scott Graham	(216) 977-7123
Space Payload Projects	Steve Simons	(216) 433-5277
Space Power Projects	Bruce Manners	(216) 433-8341
Space Propulsion Projects	Rex Delventhal	(216) 433-5608
Systems Engineering & Analysis	Daniel Gauntner	(216) 433-3254
<u>SMA Disciplines:</u>		
System Safety	Bill Schoren	(216) 433-2356
Reliability	Vince Lalli	(216) 433-2354
Quality Assurance	Tim Gaydos	(216) 433-6533
Materials & Processes	John Reagan	(216) 433-2357
Risk Assessment & Management	Frank Robinson	(216) 433-2340
Software Assurance	Cynthia Calhoun	(216) 433-6390
Probabilistic Risk Modeling	Jeff Rusick	(216) 433-5375
Accident Investigation, MORT	Manny Dominguez, CSP	(216) 433-6735
Industrial Hygiene	Mike Blotzer, CIH, CSP	(216) 433-8159
Health Physics	Chris Blasio, CHP, CIH, CSP	(216) 433-6620

* Providing Support

Engineering & Test Facilities

Engineering Flight Hardware Development Labs., John Taylor, Chief, Engineering Design Division, (216) 433-5324

Structural Dynamics – <http://www.grc.nasa.gov/WWW/Facilities/int/sdl/index.html>

EMI – <http://www.grc.nasa.gov/WWW/Facilities/int/emi/index.html>

Acoustics – <http://www.grc.nasa.gov/WWW/Facilities/int/atl/index.html>

Microgravity Emissions – <http://www.grc.nasa.gov/WWW/Facilities/int/mel/index.html>

Structures – <http://www.grc.nasa.gov/WWW/Facilities/int/ssl/index.html>

Ballistic Testing/Analysis Lab., Dennis Huff, Structures and Acoustics Division, (216) 433-3913, Impact Lab. – <http://ballistics.grc.nasa.gov>

Software Engineering Labs., Sasi Pillay, Chief, Information Systems Division, (216) 433-9300

Aeronautics Labs., Tunnels and Propulsion Cells, Jeff Haas, Chief, Research Testing Division, (216) 433-5718

Icing Research Tunnel, Tom Bond, Chief, Icing Branch, (216) 433-3900

Materials & Structures Research Labs., Materials Burner Rig, & High Temperature Composites Lab., Hugh Gray, Chief, Materials Division, (216) 433-3680

GRC Satellite Mobile Communication Testbed Truck, Greg Follen, Computing & Interdisciplinary System Office (216) 433-5193 (provides mobile high speed internet service)

James Lloyd, 11:37 AM 2/19/2003 -0500, Fwd: Offers of Assistance to Support the Columbia

X-Sender: jlloyd@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Wed, 19 Feb 2003 11:37:55 -0500
To: prichard@hq.nasa.gov, pete Rutledge <prutledg@hq.nasa.gov>
From: James Lloyd <jlloyd@hq.nasa.gov>
Subject: Fwd: Offers of Assistance to Support the Columbia
Investigation/Recovery

Here are explicit instructions on how the offers of assistance that have been made need to be acknowledged.

X-Sender: twijdoog@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Wed, 19 Feb 2003 10:37:40 -0500
To: jlloyd@hq.nasa.gov
From: Theresia Wijdoogen <twijdoog@hq.nasa.gov>
Subject: Fwd: Offers of Assistance to Support the Columbia
Investigation/Recovery

X-Sender: smiley@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Wed, 19 Feb 2003 10:29:37 -0500
To: rsenske@mail.hq.nasa.gov, jsoper@mail.hq.nasa.gov,
sschmid1@mail.hq.nasa.gov, courtney.stadd@hq.nasa.gov,
rwillia3@mail.hq.nasa.gov, tsulliva@mail.hq.nasa.gov,
vicki.novak@hq.nasa.gov, ppastore@mail.hq.nasa.gov,
thomas.luedtke@hq.nasa.gov, john.schumacher@hq.nasa.gov,
jeffrey.sutton@hq.nasa.gov, ralph.thomas@hq.nasa.gov,
jbingham@mail.hq.nasa.gov, gmahone@mail.hq.nasa.gov,
boconnor@mail.hq.nasa.gov, eweiler@mail.hq.nasa.gov,
gasrar@mail.hq.nasa.gov, dsaleeba@mail.hq.nasa.gov, mkicza@hq.nasa.gov,
space@hq.nasa.gov, sisakowi@mail.hq.nasa.gov,
pciganer@mail.hq.nasa.gov, smiley@mail.hq.nasa.gov,
Paul.Strassmann@nasa.gov, slucid@hq.nasa.gov, chornor@hq.nasa.gov,
tbradley@mail.hq.nasa.gov, jcreedon@mail.hq.nasa.gov,
adonahue@mail.hq.nasa.gov, jjennings@mail.hq.nasa.gov,
aloston@mail.hq.nasa.gov, gbrown2@mail.hq.nasa.gov,
mgreenfi@mail.hq.nasa.gov, dhaydenw@mail.hq.nasa.gov
From: Steve Miley <smiley@hq.nasa.gov>
Subject: Offers of Assistance to Support the Columbia
Investigation/Recovery
Cc: csaldana@mail.hq.nasa.gov, bblinebu@mail.hq.nasa.gov,
shiron.gaines@hq.nasa.gov, smiley@mail.hq.nasa.gov,
vmcgill@mail.hq.nasa.gov, maureen.moore@hq.nasa.gov,
lona.Butler@hq.nasa.gov, pamelabarnes@hq.nasa.gov,
judy.wissinger@hq.nasa.gov, dsimms@mail.hq.nasa.gov,
dyates@mail.hq.nasa.gov, tgrimes@mail.hq.nasa.gov,

omega.jones@hq.nasa.gov, dgross1@mail.hq.nasa.gov,
patricia.ellis@hq.nasa.gov, bridget.bond@hq.nasa.gov,
denise.stewart@hq.nasa.gov, dbrooks@mail.hq.nasa.gov,
mary.stites@hq.nasa.gov, lvinson@mail.hq.nasa.gov,
donna.graham@hq.nasa.gov, sfenn@mail.hq.nasa.gov,
linda.lynch@hq.nasa.gov, twijdoog@mail.hq.nasa.gov,
gaile.eastman@hq.nasa.gov, pball@hq.nasa.gov, ediaz@mail.hq.nasa.gov,
amurray@hq.nasa.gov, sreidcar@mail.hq.nasa.gov,
bmaxwell@mail.hq.nasa.gov, lbodwin@mail.hq.nasa.gov,
jgross@mail.hq.nasa.gov, djohnso2@hq.nasa.gov, cmason@mail.hq.nasa.gov,
amichael@hq.nasa.gov, dcontee@mail.hq.nasa.gov, vellerbe@hq.nasa.gov,
tmccall@mail.hq.nasa.gov, kburnett@hq.nasa.gov, sball1@hq.nasa.gov,
dyoung1@hq.nasa.gov, sstovall@hq.nasa.gov, bfenner@hq.nasa.gov,
tgrimes@mail.hq.nasa.gov

To the Headquarters Senior Staff:

In view of the many offers of assistance members of the NASA Headquarters Senior Staff continue to receive concerning the Space Shuttle Columbia investigation and recovery, we need to be sure to provide a courteous and timely response to these kind offers. We also need to identify for consideration of the Columbia Accident Investigation Board and supporting Task Force offers from individuals/firms with special skills/expertise that may be of use in the investigation.

Please use the enclosed instructions (one page) to address offers of assistance you receive. Even if you have already responded personally to an offer of assistance, please forward the information as described and note in your email the nature of your response.

Please contact me at 202-253-8045 if you have questions regarding this message.

Cordially,

Steven C. Miley
Office of the Administrator
Code AA
NASA Headquarters
TEL: 202-358-0493

e-mail: smiley@hq.nasa.gov



James Lloyd, 11:37 AM 2/19/2003 -0500, Fwd: Offers of Assistance to Support the Columbia

Jim

Offers of Assistance to Support the Columbia Investigation/Recovery

Background

NASA Headquarters Officials-in-Charge receiving offers of assistance from non-NASA individuals to assist in activities related to the Columbia accident are requested to provide the information below to Code CIC. The CIC will serve as a central information collection and distribution center regarding these offers and will coordinate with the Headquarters Contingency Action Team (HCAT) and the Columbia Action Center (CAC), as appropriate.

To permit the timely distribution of information, the official/office receiving an offer of assistance should provide the Code CIC point of contact (Ms. Bridget Fenner, 358-0909, bfenner@hq.nasa.gov) with any available information, such as:

- Name of person offering assistance
- Telephone number; e-mail; facsimile number; mailing address
- A description of the assistance offered
- Indication whether a response has already been made verbally, or a copy of any written response already provided.

If the offer is via email, simply forward the email to: bfenner@hq.nasa.gov and you need not take any further action. You may of course choose to send a personal reply, and in that case, please send a courtesy copy of your reply to bfenner@hq.nasa.gov, so that the CIC can send regular updates, e.g., Mission Control Status Reports, press releases, etc., to these individuals.

Below is a "standard response" that will be used by the CIC. If you elect to personally respond, you may want to use similar language.

Email Response to Offers of Assistance

Thank you for your generous offer of assistance regarding NASA's loss of the courageous STS-107 crew and the Space Shuttle Columbia. As NASA identifies areas requiring special assistance, you may be contacted to share your insight and expertise to support the investigation. We have added your email address to our distribution list and you will receive updates regarding the Columbia accident. If you wish to discontinue receiving these updates, you can unsubscribe by following the instructions included with each update. The entire NASA family appreciates your thoughtfulness as we recover from this terrible tragedy.

Sincerely,

Public Inquiries Management Office
National Aeronautics and Space Administration

Specific Expertise

If the offer of assistance includes a description of specific expertise or a resume, this data will be provided to the Columbia Accident Investigation Board Task Force.

Updates

Beginning with February 24, 2003, Senior Staff Meeting, the CIC will have available weekly updates containing summary information regarding offers of assistance. It will include a listing of the names of individuals having offered their assistance.

From: I
To: "prichard@mail.hq.nasa.gov" <prichard@mail.hq.nasa.gov>
Subject: SME Documents
Date: Tue, 4 Feb 2003 12:12:11 -0800
Importance: high
X-Mailer: Internet Mail Service (5.5.2653.19)

Pam,

Attached find a spreadsheet with all of the SMEs we have so far, plus attached, find the doc.s I created it from. I've uploaded to the 107 Team site, and cleared out all of the extra documents and subdirectories. I also back-filled some the contact info using X.500, and per Jon Mullin's request, updated

Please feel free to modify/add fields - we can discuss tomorrow when I'm at HQ, or you can call me at the office (

<<107 Team Master SMEs List 02-04-03.xls>> <<LaRCHelp.pdf>> <<Risk Assessment Experts.doc>> <<Safety Experts.doc>>



107 Team Master SMEs List 02-04-03.xls



LaRCHelp.pdf



Risk Assessment Experts.doc



Safety Experts.doc

Category	Expertise	Title	First Name	Last Name	Email	Org.	Job Title	Work Phone	Fax #	Home Phone	Cell Phone	F pager
Structure & Materials	Experience in Static aerodynamic heating, major F-15/During the Oyster Experiments Program.	Vince	Zobry	E.W.Zobry@harc.nasa.gov	LRPC			(757) 864-4388	(757) 864-6570			
Structure & Materials	Significant experience on Shuttle and other entry vehicle trajectory, aerobically, and light mechanics analysis.	Chuck	Powell	R.W.Powell@harc.nasa.gov	LRPC			(757) 864-4308	(757) 864-4871			
Structure & Materials	Significant experience working entry and hypersonic aerodynamics.	Charles	Milby	C.G.Milby@harc.nasa.gov	LRPC		Aerothermodynamics Branch Head	(757) 864-5221				
Structure & Materials	Head of LRPC structures and materials competency with experts in structures and materials, including aluminum and composite structures and TPS design. Responsible for the landing loads facility with expertise in landing gear and the design.	Mark	Shuman	M.J.Shuman@harc.nasa.gov	LRPC		Structures and Materials Competency Director	(757) 864-5492				
Risk Assessment	Probabilistic Risk Assessment, Quantitative/Qualitative Risk Assessment/Management	Chuck	Mantz		Statley Factory Associates APC/Hernandez Engineering, Inc.			(650) 904-2828				

Brian,

I wanted to contact you and offer any help that we could provide. I have experts in the areas of aerothermodynamics, aerodynamics, and structures and materials that could support your efforts. The following people I think could be possible expert consultants:

- Experience in Shuttle aerodynamic ^{heating} trajectory
Major P.I. during the Orbiter Experiments Program.

- ^{Significant} Long experience on Shuttle and other entry vehicle trajectory, aeroheating, and flight mechanics analysis.

- ^{Significant} Long experience working entry and hypersonic aerodynamics.

- **Mark Shuart** - Head of our structures and materials competency with experts in structures and materials, including aluminum and composite structures and TPS designs. He is also responsible for the landing loads facility with expertise in landing gear and tire design.

If we can be of help, let me know. I will be available either at home or by pager and cell phone.

Risk Assessment Experts

Safetv Factor Associates

Safety Experts:

Faith Chandler, 07:50 AM 2/5/2003 -0500, Fwd: NEED HELP ???

X-Sender: fchandle@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Wed, 05 Feb 2003 07:50:32 -0500
To: prichard@hq.nasa.gov
From: Faith Chandler <fchandle@hq.nasa.gov>
Subject: Fwd: NEED HELP ???

Pam,
FYI..

Date: Tue, 04 Feb 2003 07:20:04 -0500
To: HCAT@hq.nasa.gov
From: Faith Chandler <fchandle@hq.nasa.gov>
Subject: Fwd: NEED HELP ???

Bill,

Here is an offer of assistance from my colleague at the DOE. He has performed many investigations.
Faith

X-Server-Uid: 0bf4d294-faec-11d1-a39a-0008c7246279
From: "Vernon, Dennis" <Dennis.Vernon@eh.doe.gov>
To: "Faith Chandler" <fchandle@hq.nasa.gov>
Subject: NEED HELP ???
Date: Sun, 2 Feb 2003 21:02:41 -0500
X-Mailer: Internet Mail Service (5.5.2655.55)
X-WSS-ID: 1223124820783-01-02

Faith:

I know that you must be very busy, so I'll just get to the point. Please advise what assistance, if any, you wish for either me or my Department to provide for your investigation.

As you know, I'm currently planning to conduct an accident investigation training class in Alburquerque, New Mexico the end of February. However, I am more than willing to postpone this training class to a later date in order to render any assistance that I, my training staff cadre and/or other DOE experienced accident investigators can provide. Just let me now what assistance, if any, you want us to provide.

Best Wishes,

Dennis Vernon
DOE Accident Investigation Program Manager
Office of Special Projects and Investigations
Corporate Safety Assurance
Environment, Safety and Health
U.S. Department of Energy

Faith Chandler, 07:50 AM 2/5/2003 -0500, Fwd: NEED HELP ???

Office: (301) 903-4839

Faith Chandler

NASA Headquarters
Office of Safety and Mission Assurance
Code Q Rm 5x40
300 E Street, S.W
Washington, D.C 20546

202-358-0411
202-358-2778 (fax)

Faith Chandler, 07:52 AM 2/5/2003 -0500, Fwd: Crash and Crime Scene Investigation Software appli

X-Sender: fchandle@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Wed, 05 Feb 2003 07:52:25 -0500
To: HCAT@hq.nasa.gov
From: Faith Chandler <fchandle@hq.nasa.gov>
Subject: Fwd: Crash and Crime Scene Investigation Software application
Cc: prichard@hq.nasa.gov

Bill,

A tool to consider in use during the accident reconstruction.
I do not have much knowledge of this tool.
Darcy is a HF person in Ronnie Goodin's safety office at KSC.

From: "Miller-1, Darcy" <Darcy.H.Miller@nasa.gov>
To: "fchandle@hq.nasa.gov" <fchandle@hq.nasa.gov>
Subject: Crash and Crime Scene Investigation Software application
Date: Tue, 4 Feb 2003 14:07:40 -0500
X-Mailer: Internet Mail Service (5.5.2653.19)

Faith,

I would like to pass this information on to someone who may be able to use it in NASA, either now in Texas or in the future. It looks promising. It is designed for crash and crime scene investigation. It was referred to me by someone that I worked with in the past and the company has a good reputation with us. I would like to get this to the right person who can see if it could improve our recovery and reconstruction process. Optimus, the company, is not asking for money, just to help out, but of course the publicity would be outstanding for the product.

- > Here are the additional benefits that I noted when I called _____ of
 - > Optimus. Although I do not know the system that we are using in Texas and
 - > I have not seen the Optimus system, Wesley compared it to other typical
 - > systems when he explained it.
 - > * Logging location of parts: Other systems are accurate within about
 - > 30 feet, this one is accurate within 1 cm.
 - > * Other systems require more than one person to take the reading, this
 - > one requires only one person with a laptop.
 - > * Makes use of 'WAS', a satellite system and a patented filter.
 - > * It uses drop down menus and has areas for text entry to describe and
 - > document the parts for later reconstruction.
 - > * They work in the DC area, but can go to Texas.
 - > * Training to collect the data in the field requires about 30 minutes.
 - * It was just released last month for commercial use, so not many
- people would know about it yet.

Thank you,

> Darcy Miller
> PH-P1
> 321-861-1846

> -----Original Message-----

> From:
> Sent: Tuesday, February 04, 2003 9:54 AM
> To: Darcy.H.Miller@nasa.gov
> Subject: OPTIMUS Corporation - AutoDOCS

>
>
> Ms. Miller,

>
> Patrick Xantus, Acting Director of Public Safety gave me your name and
> contact information. As you may recall he and worked on the
> NASA EPIC project. I am contacting you in regards to another product we
> developed that came out of the SBIR program, AutoDOCS. It is a crash and
> crime scene reconstruction system using GPS technology. Points are
> measured within 1 CM of accuracy and car, plane, etc. parts are input
> electronically through scroll-down menus on a laptop computer. Upon
> completion of the measurements and data input, information is then stored
> in a database with a GIS to display all the points. We are trying to setup
> a pilot with NTSB for the use in air disasters, and wanted to know if you
> (or knew someone that would be) interested in using the product for the
> Columbia Disaster?

>
> If you are interested in learning more about the product or would like to
> use the system to assist in the data collection at no charge, please feel
> free to give me a call or email me.

>
> Sincerely,

>
>
>
> OPTIMUS Corporation
>
>

Faith Chandler

NASA Headquarters
Office of Safety and Mission Assurance
Code Q Rm 5x40
300 E Street, S.W
Washington, D.C 20546

Faith Chandler, 07:52 AM 2/5/2003 -0500, Fwd: Crash and Crime Scene Investigation Software appli

202-358-0411

202-358-2778 (fax)

X-Sender: wfrazier@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Wed, 05 Feb 2003 10:08:32 -0500
To: hcat@hq.nasa.gov
From: "Wayne R. Frazier" <wfrazier@hq.nasa.gov>
Subject: Defense Intelligence offer
Cc: whill@hq.nasa.gov, prichard@hq.nasa.gov, jlloyd@hq.nasa.gov,
jlemke@hq.nasa.gov, pruttedg@hq.nasa.gov, jmullin@hq.nasa.gov

This date received an offer from DIA (Bill Hungate through a third party) at Patrick AFB to offer DIA services to overfly the crash site with a hyperspectral scanner that has 3" resolution for hard objects in vegetation. Passed to Jon Mullin in Code QS who called FEMA EST rep Justin Tillman (646.2461) who called back and recommended we have DIA Patrick call Mr. Wayne Farley at the Lufkin DFO at 318.456.7238. Called DIA back at 0950 Feb 5 and talked to LTC Jeff Grantham (321.494.6240) who will contact Lufkin DFO.

Wayne

Wayne R. Frazier
NASA Headquarters - Code QS
Office of Safety and Mission Assurance
Washington, DC 20546-0001
Ph: 202 358-0588 Fax: 202 358-3104

"Mission success starts with safety"

Ralph A'Harrah, 10:35 AM 2/5/2003 -0500, Fwd: Maybe a way to fix the problem w/ the Space shuttle

Sometime we have to take a step back and go a little bit simpler. Using the kiss method (Keep It Simple Stupid) (not to be thought of as a bad way).

I was thinking of using a NET or SCREEN around the top of the rocket where the foam came off.

This would catch the foam if it did come off or hold it in place. Make it as tough as possible, although the tank I would think gets hot.

This way it would never hit the shuttle.

Cheap and effective way to fix the problem.

I worked for Hugh Aircraft as a programmer before I was hurt.

Maybe you could give this a thought and pass it on..!!!! Then the Space Shuttle Program can keep flying into space ASAP.

Pete Rutledge, 11:00 AM 2/5/2003 -0500, Fwd: Re: NASDA support for STS-107 investigation

X-Sender: prutledg@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Wed, 05 Feb 2003 11:00:01 -0500
To: prichard@hq.nasa.gov
From: Pete Rutledge <prutledg@hq.nasa.gov>
Subject: Fwd: Re: NASDA support for STS-107 investigation

Pam,

Following is an offer of help from NASDA. Mark has responded, but the door is still open if a need arises. So, I'd say let's add it to the list.

Pete

X-Sender: mkowales@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Wed, 05 Feb 2003 08:05:04 -0500
To:
From: Mark Kowaleski <mkowales@hq.nasa.gov>
Subject: Re: NASDA support for STS-107 investigation
Cc: mark.d.erminger1@jsc.nasa.gov, prutledg@mail.hq.nasa.gov,
jlloyd@mail.hq.nasa.gov, wbihner@mail.hq.nasa.gov

Thank you for your kind words.

We have suspended all processing of future missions until the STS-107 mishap has been resolved.

NASA has applied an enormous amount of resources to the investigation, both inside and outside of NASA. We appreciate your willingness to help, but I suspect that the distance would probably make it difficult for NASDA to contribute in a significant capacity. If NASDA specific questions arise, we will contact NASDA immediately.

Further, as we have already experienced, any data exchange would be severely limited due to the export control regulations and we cannot put the resources into the ITAR process at this time.

We ask for your patience. NASDA will be informed of the findings and recommendations when the investigation is completed.

Thank you.

Mark

At 04:14 PM 2/5/2003 +0900, you wrote:
Mark,

Pete Rutledge, 11:00 AM 2/5/2003 -0500, Fwd: Re: NASDA support for STS-107 investigation

I saw beautiful launch of STS-107 under the blue sky from the entrance of the SSPF/KSC and I have never thought of such tragedy at the time. I am really sorry and feel anew the weightiness of working for safety. Flight crew always trusts us, all on ground. We must respond to them. We must go forward with the cherished desire of STS-107 crew.

NASDA is trying to contribute to overcome the tragedy and sent people to NASA Head Quarters. I know it is very small what NASDA can do, however we might be able to do something, such as checking Japanese manufacturer if exits. Also we must prepare for STS-114, next scheduled flight.

What kind of activity will NASA S&MA community do for STS-107? I ma sure NASA S&MA needs to play integral part. NASDA will be most grateful if NASA S&MA could allow us to be involved in your activity. Would you please talk inside NASA S&MA? Based on your response, I would like Mr. , NASDA counter part of Mr. O\$B!G(BConnor, to write a letter to Mr. O\$B!G(BConnor to this effect.

Expressing heartfelt condolences-

NASDA S&PA

Peter J. Rutledge, Ph.D.
Director, Enterprise Safety and Mission Assurance Division
Acting Director, Review and Assessment Division
Office of Safety and Mission Assurance
NASA Headquarters, Code QE, Washington, DC 20546

ph: 202-358-0579

FAX:202-358-2778

e-mail: pete.rutledge@hq.nasa.gov

Mission Success Starts with Safety!

Pete Rutledge, 06:17 PM 2/3/2003 -0500, Re: Support for Bryan O'Connor on Columbia Accident

Mission Success Starts with Safety!

X-Sender: ygawdiak@mail.hq.nasa.gov
Date: Tue, 4 Feb 2003 09:14:57 -0500
To: pruttedg@mail.hq.nasa.gov, prichard@mail.hq.nasa.gov
From: Yuri Gawdiak <ygawdiak@hq.nasa.gov>
Subject: Fwd: Data systems support for wreckage recovery at Barksdale
Cc: ecs-level1@postdoc.arc.nasa.gov

Pete,

Just to give you a heads up we've sent a team down to Shreveport last night to support Vern and his folks. We've also assembled a tiger team at ARC to work some of the scaling and interface issues of IO based on the initial feedback from the CONTOUR mishap.

I'll keep you posted as events warrant.

tx, -yuri

Vern,

be advised that James Williams and Ian Sturken from NASA Ames will arrive in Shreveport late tonight and will contact you on your cell in the morning.

They are bringing laptops that with web access will provide access to InvestigationOrganizer on the Ames server. They will also bring a copy of the software that can be loaded onto a local machine if necessary. They are ready to work with you and others to structure the data fields and data relationships to meet the requirements of the investigation. We can then work out the procedures and resources for training and data entry.

I'll be in contact with them throughout the days but feel to contact me directly as well.

take care,
Tina

From: Ellingstad Vern <Ellingv@ntsb.gov>
To: "Yuri Gawdiak (E-mail)" <ygawdiak@mail.arc.nasa.gov>
Cc: "Tina L Panontin (E-mail)" <Tina.L.Panontin@nasa.gov>, "whill@hq.nasa.gov" <whill@hq.nasa.gov>, Benzon Robert <BENZONR@ntsb.gov>, Hilldrup Frank <HILLDRF@ntsb.gov>, "Richard.M.Keller@nasa.gov" <Richard.M.Keller@nasa.gov>, Clark John <clarkj@ntsb.gov>
Subject: Data systems support for wreckage recovery at Barksdale
Date: Mon, 3 Feb 2003 14:35:18 -0500
X-OriginalArrivalTime: 03 Feb 2003 19:26:28.0625 (UTC) FILETIME=[2645A810:01C2CBBA]

As I indicated in our conversation, there is an urgent need to quickly implement a database to capture information pertinent to each piece of wreckage that is recovered from Columbia. I believe that the

Investigation Organizer that Tina Panontin and her group at Ames have developed provides the proper infrastructure to accomplish this.

The most important immediate need is to implement a procedure to associate a unique identifier to each recovered piece (or collection of pieces) along with a basic set of descriptive information. It is my understanding that the MIT has implemented a tagging system that uses the name of the recovery team leader and a sequential number to uniquely identify each part, and records the following information:

- * Lat/long
- * Date tagged
- * Rough description
- * Hazardous material (yes/no)
- * Photo # (will need to be tied to whatever photo db is established)
- * Part Number (if present)
- * Batch identifier for small parts.

Obviously we can broaden this set of variables if appropriate. It will also be important to provide hooks to other datasets, such as radar target tracks, etc.

I intend to fly to Shreveport in the morning. I would suggest that you launch two or three people from NASA Ames and that we tag up in the morning. I will let you know when I have found a place to stay. I assume that we will have facilities available at Barksdale and will try to work that out with our folks on the ground there (Benzon and Hilldrup) before I head out.

I would suggest that the Ames people bring along whatever hardware they need to set up the data system and provide for data entry. We will probably need to anticipate training people to do data entry.

Please let me know if there are any difficulties with this plan. Thanks.

Vern Ellingtad

X-Sender: pmartin@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Tue, 04 Feb 2003 10:50:49 -0500
To: prichard@hq.nasa.gov
From: Patrick Martin <pmartin@hq.nasa.gov>
Subject: Offer of Independent SR&QA support for the CAIT

Pam,

I understand you are creating a list of folks that have offered support to the Columbia Accident Investigation activities. On Sunday, I received a phone call from Mr. Randy Stone, SRQA Director for the Missile Defence Agency (MDA). He offered that they could possibly provide independent investigation support if desired. Randy has been personally involved with several ELV (Delta) MIB's. His contact numbers are :
Office- 703-693-9051,

Pat

Pete Rutledge, 05:44 PM 2/3/2003 -0500, Fwd: Offer of help

X-Sender: prutledg@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Mon, 03 Feb 2003 17:44:35 -0500
To: prichard@hq.nasa.gov
From: Pete Rutledge <prutledg@hq.nasa.gov>
Subject: Fwd: Offer of help

Pam, FYI. Something coming. Pete

X-Sender: |
X-Mailer: QUALCOMM Windows Eudora Version 5.1
Date: Mon, 03 Feb 2003 12:40:45 -0600
To: prutledg@hq.nasa.gov
From:
Subject: Offer of help

Pete. Thanks for your prompt reply at this sad time and a very busy one for you. Laurel Clark was a colleague and friend of mine - we were in Pensacola together as Flight Surgeons. I shall e-mail that material to Pam Richardson after I assemble it tonight.

Peter J. Rutledge, Ph.D.
Director, Enterprise Safety and Mission Assurance Division
Acting Director, Review and Assessment Division
Office of Safety and Mission Assurance
NASA Headquarters, Code QE, Washington, DC 20546

ph: 202-358-0579
FAX:202-358-2778
e-mail: pete.rutledge@hq.nasa.gov

Mission Success Starts with Safety!

Pete Rutledge, 12:46 PM 2/3/2003 -0500, Your offer of expertise

X-Sender: prutledg@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Mon, 03 Feb 2003 12:46:04 -0500
To:
From: Pete Rutledge <prutledg@hq.nasa.gov>
Subject: Your offer of expertise
Cc: prichard@hq.nasa.gov

Thank you for your call, your thoughts, and your offer to be of help. We are building a list of subject matter experts who have offered to help. So that we can add you to that list, would you please e-mail Pam Richardson in my office (e-mail address above) with you name, phone, e-mail address, and most importantly your areas of expertise. Might not be a bad idea to attach your bio. We have not yet gotten requirements for subject matter experts but we want to be prepared and will probably provide a list to Bryan even before he asks for it.

Thanks and best regards,

Pete

Peter J. Rutledge, Ph.D.
Director, Enterprise Safety and Mission Assurance Division
Acting Director, Review and Assessment Division
Office of Safety and Mission Assurance
NASA Headquarters, Code QE, Washington, DC 20546

ph: 202-358-0579
FAX:202-358-2778
e-mail: pete.rutledge@hq.nasa.gov

Mission Success Starts with Safety!

X-Sender: prutledg@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Wed, 05 Feb 2003 11:03:59 -0500
To: prichard@hq.nasa.gov
From: Pete Rutledge <prutledg@hq.nasa.gov>
Subject: Offer of help from Futron

Here's another offer from an individual at Futron, but certainly implies the availability of help from the corporation, as well. Good to add to list.

Pete

Date: Wed, 5 Feb 2003 04:02:50 -0800 (PST)
From:
Subject: TPS and others
To: prutledg@hq.nasa.gov

Hi Pete,

I have no words to describe my sad feelings for such a tragic event. We had an internal Futron meeting yesterday to discuss how we can help your organization either as a group or as individuals with special expertise. I've been encouraged by other Futronians to share with you some of my unique experience which may be particularly relevant for your future work ahead. These are listed in my resume as well.

- extensively involved with failure and anomaly investigation for L/V and satellite programs.
- lead an independent assessment team to evaluate Common Standards Working Group's (formed by FAA and US Air Force) proposal on ELV launch failure probability estimates for flight safety analyses
- technical lead for ELV, X-34 and NASP thermal control (this is the area where TPS falls under). Activities included analysis, design, fabrication, testing and integration.
- technical lead to quantify aero-thermal environment for hypersonic vehicles
- technical lead to perform shuttle reentry dispersal analysis for SP-100 (with nuclear reactor onboard)
- program manager for NASA NSRS program

As for my experience in safety, reliability and PRA areas, we talked about it already.

If there is anything that you consider Futron can contribute collectively or individually, we are

- standing by.

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Mission Success Starts with Safety!

X-Sender: jmullin@mail.hq.nasa.gov
X-Mailer: QUALCOMM Windows Eudora Version 4.3.2
Date: Thu, 06 Feb 2003 15:12:20 -0500
To: bdolci@mail.arc.nasa.gov
From: "Jonathan B. Mullin" <jmullin@hq.nasa.gov>
Subject: Fwd: FW: updated version of the general guidelines for field team PPE
Cc: chunt@mail.arc.nasa.gov, guy.camomilli-1@ksc.nasa.gov, Frank.P.Mortelliti@jpl.nasa.gov, Eric.G.Fuller@jpl.nasa.gov, thomas.ambrose@dfrc.nasa.gov, HCAT@hq.nasa.gov, jlemke@hq.nasa.gov, dking@mail.arc.nasa.gov, mhulet@mail.arc.nasa.gov, prichard@hq.nasa.gov, jlloyd@hq.nasa.gov

These are the preferred IH practices for recovery. I will copy Guy Camomilli on this transmission. Please contact Bob Gafney as he is the center for all Debris information for the MIB.

Regards, Jon

Date: Wed, 05 Feb 2003 12:31:10 -0500

To: john-piasecky

From: "Jonathan B. Mullin" <jmullin@hq.nasa.gov>

Subject: Fwd: FW: updated version of the general guidelines for field team PPE

Cc: mike stevens

Bcc: Dan-Thomas,Lloyd_James,lemke-john,Frazier_Wayne,Tom Ambrose <Tom.Ambrose@dfrc.nasa.gov>,Mullin_Jonathan,Harkins_Wilson,guy-camomilli,Dr.Bill-Barry,Angotti-Cathy, Martha-Wetherholt

John, incase your teams would like to know the recommended personnel protective equipment guidance provided by a team of "Industrial Hygienists" the enclosed is provided. The source of the guidance is Code AM. Regards, Jon

X-Sender: jmullin@mail.hq.nasa.gov

X-Mailer: QUALCOMM Windows Eudora Version 4.3.2

Date: Wed, 05 Feb 2003 12:07:11 -0500

To: jlemke@hq.nasa.gov

From: "Jonathan B. Mullin" <jmullin@hq.nasa.gov>

Subject: FW: updated version of the general guidelines for field team PPE

Cc: Wayne Kee <Wayne.Kee-1@ksc.nasa.gov>, whill@hq.nasa.gov, prutledg@hq.nasa.gov, Catherine.Angotti@hq.nasa.gov, rwillia3@mail.hq.nasa.gov, snakamur@ems.jsc.nasa.gov, HCAT@hq.nasa.gov, jlloyd@hq.nasa.gov, prichard@hq.nasa.gov, wfrazier@hq.nasa.gov, dan.thomas@hq.nasa.gov, dloyd@wstf.nasa.gov

John, for the NASA Record, the enclosed General Guidelines were issued by Code AM. Both Codes AM and QS are unsure of where the other, **not attached to this correspondence**, "one page guidance" came from to advise Public Service Personnel. The Code AM enclosed guidance is more reliable guidance to Public Service Personnel due to the fact that a "team of Industrial Hygienists" have developed this product.

Regards, Jon

4 February 2003

>
> GENERAL GUIDELINES FOR PERSONNEL HEALTH PROTECTION FOR FIELD TEAMS DURING RECOVERY OF SHUTTLE DEBRIS

>
> The following recommendations are provided for personnel health protection for field teams assigned to pick up debris / materials associated with the Columbia accident. These protection guidelines are for activities including investigation, recovery, and cleanup operations. Additional guidelines may be provided for other downstream activities such as working in Shuttle debris staging areas and/or handling cataloged items.

>
> The appropriate personal protective equipment (PPE) to be used by personnel will depend on the task to be performed and proximity to debris containing hazardous material. A tiered approach to protective clothing selection is provided to allow for ease of implementation. The proper protective clothing for preventing /minimizing potential personnel exposure to hazardous materials and adequate control areas should be coordinated with the on-site health and safety supervisor. Coordinate with the NASA Recovery Team Command Post if there are any questions with this guidance. The on-site NASA JBOSC Environmental Health/Industrial Hygiene Office (EH/IH) representative supporting the recovery team may be contacted through the NASA Recovery Team Command Post if additional technical guidance is requested.

>
> a. Level A - This level of protection is to be used when exposure (potential for contact with Liquid Propellants) to hypergolic propellants (e.g. hydrazines and dinitrogen tetroxide) is a hazard. Only NASA/Contractor qualified employees should enter areas with hypergolic propellants present in EPA Level A equivalent protection with positive pressure SCBA suit/gloves made with hypergolic propellant protective /compatible materials or Propellant Handlers Ensemble (PHE),(SCAPE). Consult with NASA Recovery Team Command Post.

>
> a. Level B - This level of protection can be used during entry into an area where potential exists for depleted oxygen levels or when ammonia, Freon, hypergolic vapor or other inhalation hazards are present.>

>
> a. Level C1 - Personnel should use full face respirators equipped with High Efficiency Particulate Air (HEPA) filters, Disposable coveralls (hooded Tyvek suits over coveralls), Cut-resistant leather gloves, Disposable coverall sleeves should be taped over gloves to prevent fibers from lodging under clothing, Disposable booties or boot covers over safety shoes, and an article of clothing to protect neck area under face. Examples of these tasks would include uncontrolled inhalation hazard from dusty material (e.g. handling friable TPS materials or burned graphite composite in which dust is produced).

>
> Note: Level C1 may be downgraded to Level C2 if dust is suppressed by using wetting agents or encapsulants, (e.g. spray-on floor wax and glue).

>
> Level C2 - Personnel should use disposable respirators (HEPA, N100 or N95), disposable coveralls (Tyvek suits), heavy leather gloves, disposable booties or boot covers over safety shoes, and safety glasses with side shields or goggles.

>
> Level C2 protection would be for tasks with less potential for disturbance of composite-containing debris. Examples of these tasks would include picking up larger pieces of wetted

TPS debris or disturbing it in any other way.

>

> a. Level D - Personnel should use leather gloves and a disposable dust mask or N95 (optional). Level D protection would be for tasks with minimal potential for debris disturbance (dust unlikely). Examples would include picking up metal fragments or small pieces of TPS material.

>

> Proper protective clothing requirements should be coordinated with the on-site health and safety representatives on a daily basis. Under all circumstances, the disturbance of debris should be minimized to avoid creating airborne particulates.

>

> The following materials may pose potential health hazards when encountering Shuttle debris:

>

> 1. Metals

> * Aluminum - Boron Truss

> * These materials should be in a solid minimum hazard state.

> * This material must be inhaled or ingested to exhibit toxic effects.

> * Handle with leather gloves. Wash with soap and water if skin contact.

> * Level D PPE is recommended.

> * Epoxy-Boron Truss

> * These materials should be in a solid minimum hazard state.

> * This material must be inhaled or ingested to exhibit toxic effects.

> * Handle with leather gloves. Wash with soap and water if skin contact.

> * Level D PPE is recommended.

> * Beryllium

> * Found in windshield frame and external tank doors

> * Must be inhaled or ingested to be a hazard

> * Should be found in a solid minimum hazard state.

> * Handle with leather gloves. Wash with soap and water if skin contact.

> * Level D PPE is recommended. If material is oxidized, PPE level upgrade should be considered.

>

> 1. Hypergolic Propellants

>

> Debris suspected of containing hypergolic propellants should be examined upwind at a distance. Items potentially containing liquids or vapors of hypergolic propellants would probably be tubing, thrusters, piping, tubing/piping fittings, and vessels. If hypergolic propellants are present, the debris may be approached by NASA/Contractor qualified personnel in Level A or equivalent. Calibrated monitoring equipment should be used to determine hypergolic vapor concentrations. If no hypergolic vapors are detected, the site health and safety supervisor may downgrade PPE taking into consideration the pH of the material.

> Parts and materials contaminated with propellants that have been > "> bagged"> "> may off-gas slowly in the bag or container used for storage and shipping. Caution should be used when opening bags known or suspected to have been contaminated with propellants. Open the bags under a laboratory fume hood, and/or with proper PPE.

>

> * Hydrazine, monomethyl hydrazine, and Nitrogen tetroxide (Hypergolic Propellants)

- > * Forward and Aft reaction control system (RCS), Auxiliary Power Unit (APU), and Orbiter Maneuvering System (OMS)>
- > * > Only NASA/Contractor qualified employees should enter areas with hypergolic propellants present in OSHA Level A Protection with suit/gloves made with hypergolic propellant protective /compatible materials or Propellant Handlers Ensemble (PHE), (SCAPE)
- > * Valves are designed to fail closed, assume all tubing to be contaminated with hypergolic propellant.
- > * Appropriate control zones should be established to prevent exposure to unprotected personnel. Vessels under pressure should also be taken into consideration while establishing the control zone.
- > *
- > * 3. Cryogenics
- > *
- > * Liquid Hydrogen (LH2) and Liquid Oxygen (LO2)
- > * Heavy leather gloves are appropriate PPE for handling.
- > * See on-site Health and Safety supervisor for site-specific recommendations.
- > *
- > * 4. Refrigerants
- > * Ammonia
- > * - Orbiter coolant system. Ammonia vapors may be irritating to eyes and upper respiratory system.
- > * Utilize Level B (Self-contained breathing apparatus and skin protection) for unknown concentrations during initial characterization.
- > * Consult with on-site health and safety representative for appropriate PPE.
- > * Dichloromonofluoromethane (Freon 21)
- > * Orbiter coolant system. May displace oxygen in enclosed or poorly ventilated areas.
- > * Utilize Level B (Self-contained breathing apparatus and compatible gloves) in enclosed areas.
- > * Consult with on-site safety representative for appropriate PPE.
- >
- > 5. Thermal Protection System (TPS) Materials:
- > * Silica and other refractory fibers may be found in Shuttle tiles, blankets used on exterior Shuttle surfaces and payload bay, gap fillers, thermal barriers, heat shields.
- > * The principal acute hazards of TPS materials are eye, skin and upper respiratory (depending upon particle size) tract irritation. Irritation and abrasion, similar to that of glass fibers may occur.
- > * The level of PPE should be based on the task being performed, friability of the material and environmental conditions. Coordinate proper selection with site health and safety supervisor.
- >
- > 5. Helium Pressure Systems
- > * Forward and Aft Reaction Control System (RCS) 13 gallon helium tanks (6 tanks) and Orbiter Maneuvering System (OMS) 130 gal helium tanks (2 tanks)
- > * See site health and safety supervisor for safety precautions.
- >
- > 5. Ordnance
- > * Ordnance is located in the following areas of the Shuttle: Wheel well in main landing gear, Drag chute compartment, Main hatch, KU-Band Antenna, Emergency Egress Window, Fire extinguisher tanks

> * See site health and safety supervisor for safety precautions.

>

> 5. Other Chemicals

>

> Recovery teams should remember that various sizes of pressurized vessels used for Shuttle experiments may be present in the debris. These vessels, although small, may be highly pressurized, and should be handled with care. Coordinate with health and safety supervisor.

>

> GENERAL RECOMMENDATIONS:

>

> 1. Appropriate decontamination procedures must be followed to prevent transport of dusty debris from the work area. Donning/ doffing PPE should be performed in a clean area. Procedure to be posted at site.

>

> 2. If debris is contaminated with carbon/graphite fibers (burned graphite/composite), personnel exiting a controlled zone should use a wet/dry HEPA vacuum (if present) to decontaminate outer clothing prior to removal. Procedure to be posted at site.

>

> 3. Contaminated PPE should be disposed of in appropriate bags/containers.

>

> 4. Respirators should be wet wiped on the outside and wipes disposed of properly. Respirators may not be left in potentially contaminated areas. The inside of the respirator should not be exposed to composite materials. This could result in skin irritation around facial area. Additionally, gloves should not be left in potentially contaminated areas. Disposable respirators should be discarded in appropriate bags/containers. Follow normal respirator cleaning and disinfecting protocol.

>

> 5.> > Personnel should wash their hands and face when leaving a controlled work area and should wash their hands, forearms, and face prior to eating, drinking, or > smoking. Personnel should shower prior to going home when possible. Where possible a portable eyewash providing fifteen minutes of flow should be on site.

>

> 6. Respirator filters should be replaced whenever they are damaged, soiled, or causing noticeably increased breathing resistance (e.g., causing discomfort to the wearer). Use of protective clothing, including respiratory protection, must be used in accordance with the manufacturer's recommendations. Use of respiratory protection must be in accordance with 29 CFR 1910.134. If other respiratory protection such as organic vapor, ammonia, or other applications are needed consult with an industrial hygienist.

>

>

> Guy Camomilli, MPH, CSP

> Senior Environmental Health Officer,

> OCHMO Tenant Office

> guy.camomilli-1@ksc.nasa.gov

> Voice (321) 867-1417

> Fax (321) 867-8870

>

>

Jonathan B. Mullin
Manager Operational Safety
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"Mission Success Starts with Safety"

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Guidelines for Shuttle Columbia Recovery team helath protection 11.doc

From: "Camomilli-1, Guy" <Guy.S.Camomilli@nasa.gov>
To: "Jonathan B. Mullin" <jmullin@hq.nasa.gov>, bdolci@mail.arc.nasa.gov
Cc: chunt@mail.arc.nasa.gov, Frank.P.Mortelliti@jpl.nasa.gov,
Eric.G.Fuller@jpl.nasa.gov, thomas.ambrose@dfrc.nasa.gov,
HCAT@hq.nasa.gov, jlemke@hq.nasa.gov,
"King, David (ARC)" <dking@mail.arc.nasa.gov>,
mhulet@mail.arc.nasa.gov, prichard@hq.nasa.gov, jilloyd@hq.nasa.gov,
"Angotti, Cathy" <cangotti@hq.nasa.gov>,
"Barry-1, William" <William.S.Barry@nasa.gov>,
"Gettleman-1, Alan" <Alan.G.Gettleman@nasa.gov>,
"Geyer-1, Bart" <Bart.Geyer-1@ksc.nasa.gov>
Subject: RE: FW: updated version of the general guidelines for field team PPE
Date: Fri, 7 Feb 2003 08:01:01 -0500
X-Mailer: Internet Mail Service (5.5.2653.19)

The guidelines that Jon attached are for **health and safety personnel**. I've also attached guidelines for "lay people". Field health and safety professionals should remember that they have the best perspective on what's appropriate for the specific situation, and use their professional judgment.

Guy Camomilli, MPH, CSP
Senior Environmental Health Officer,
OCHMO Tenant Office
guy.camomilli-1@ksc.nasa.gov
Voice (321) 867-1417
Fax (321) 867-8870

-----Original Message-----

From: Jonathan B. Mullin [mailto:jmullin@hq.nasa.gov]
Sent: Thursday, February 06, 2003 3:12 PM
To: bdolci@mail.arc.nasa.gov
Cc: chunt@mail.arc.nasa.gov; Guy.S.Camomilli@nasa.gov; Frank.P.Mortelliti@jpl.nasa.gov;
Eric.G.Fuller@jpl.nasa.gov; thomas.ambrose@dfrc.nasa.gov; HCAT@hq.nasa.gov; jlemke@hq.nasa.gov;
dking@mail.arc.nasa.gov; mhulet@mail.arc.nasa.gov; prichard@hq.nasa.gov; jilloyd@hq.nasa.gov
Subject: Fwd: FW: updated version of the general guidelines for field team PPE
Importance: High

These are the preferred IH practices for recovery. I will copy Guy Camomilli on this transmission. Please contact Bob Gafney as he is the center for all Debris information for the MIB.

Regards, Jon

Date: Wed, 05 Feb 2003 12:31:10 -0500

To: john-piasecky

From: "Jonathan B. Mullin" <jmullin@hq.nasa.gov>

Subject: Fwd: FW: updated version of the general guidelines for field team PPE

Cc: mike stevens

Bcc: Dan-Thomas,Lloyd_James,lemke-john,Frazier_Wayne,Tom Ambrose
<Tom.Ambrose@dfrc.nasa.gov>,Mullin_Jonathan,Harkins_Wilson,guy-camomilli,Dr.Bill-
Barry,Angotti-Cathy, Martha-Wetherholt

John, incase your teams would like to know the recommended personnel protective

equipment guidance provided by a team of "Industrial Hygienists" the enclosed is provided. The source of the guidance is Code AM. Regards, Jon

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Date: Wed, 05 Feb 2003 12:07:11 -0500

To: jlemke@hq.nasa.gov

From: "Jonathan B. Mullin" <jmullin@hq.nasa.gov>

Subject: FW: updated version of the general guidelines for field team

PPE

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John, for the NASA Record, the enclosed General Guidelines were issued by Code AM. Both Codes AM and QS are unsure of where the other, **not attached to this correspondence**, "one page guidance" came from to advise Public Service Personnel. The Code AM enclosed guidance is more reliable guidance to Public Service Personnel due to the fact that a "team of Industrial Hygienists" have developed this product.
Regards, Jon

4 February 2003

- >
- > GENERAL GUIDELINES FOR PERSONNEL HEALTH PROTECTION FOR FIELD TEAMS DURING RECOVERY OF SHUTTLE DEBRIS
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- > The following recommendations are provided for personnel health protection for field teams assigned to pick up debris / materials associated with the Columbia accident. These protection guidelines are for activities including investigation, recovery, and cleanup operations. Additional guidelines may be provided for other downstream activities such as working in Shuttle debris staging areas and/or handling cataloged items.
- >
- > The appropriate personal protective equipment (PPE) to be used by personnel will depend on the task to be performed and proximity to debris containing hazardous material. A tiered approach to protective clothing selection is provided to allow for ease of implementation. The proper protective clothing for preventing /minimizing potential personnel exposure to hazardous materials and adequate control areas should be coordinated with the on-site health and safety supervisor. Coordinate with the NASA Recovery Team Command Post if there are any questions with this guidance. The on-site NASA JBOSC Environmental Health/Industrial Hygiene Office (EH/IH) representative supporting the recovery team may be contacted through the NASA Recovery Team Command Post if additional technical guidance is requested.
- >
- > a. Level A - This level of protection is to be used when exposure (potential for contact with Liquid Propellants) to hypergolic propellants (e.g. hydrazines and dinitrogen tetroxide) is a hazard. Only NASA/Contractor qualified employees should enter areas with hypergolic propellants present in EPA Level A equivalent protection with positive

pressure SCBA suit/gloves made with hypergolic propellant protective /compatible materials or Propellant Handlers Ensemble (PHE),(SCAPE). Consult with NASA Recovery Team Command Post.

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> a. Level B - This level of protection can be used during entry into an area where potential exists for depleted oxygen levels or when ammonia, Freon, hypergolic vapor or other inhalation hazards are present.>

>

> a. Level C1 - Personnel should use full face respirators equipped with High Efficiency Particulate Air (HEPA) filters, Disposable coveralls (hooded Tyvek suits over coveralls), Cut-resistant leather gloves, Disposable coverall sleeves should be taped over gloves to prevent fibers from lodging under clothing, Disposable booties or boot covers over safety shoes, and an article of clothing to protect neck area under face. Examples of these tasks would include uncontrolled inhalation hazard from dusty material (e.g. handling friable TPS materials or burned graphite composite in which dust is produced).

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> Note: Level C1 may be downgraded to Level C2 if dust is suppressed by using wetting agents or encapsulants, (e.g. spray-on floor wax and glue).

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> Level C2 - Personnel should use disposable respirators (HEPA, N100 or N95), disposable coveralls (Tyvek suits), heavy leather gloves, disposable booties or boot covers over safety shoes, and safety glasses with side shields or goggles.

>

> Level C2 protection would be for tasks with less potential for disturbance of composite-containing debris. Examples of these tasks would include picking up larger pieces of wetted TPS debris or disturbing it in any other way.

>

> a. Level D - Personnel should use leather gloves and a disposable dust mask or N95 (optional). Level D protection would be for tasks with minimal potential for debris disturbance (dust unlikely). Examples would include picking up metal fragments or small pieces of TPS material.

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> Proper protective clothing requirements should be coordinated with the on-site health and safety representatives on a daily basis. Under all circumstances, the disturbance of debris should be minimized to avoid creating airborne particulates.

>

> The following materials may pose potential health hazards when encountering Shuttle debris:

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> 1. Metals

> * Aluminum - Boron Truss

> * These materials should be in a solid minimum hazard state.

> * This material must be inhaled or ingested to exhibit toxic effects.

> * Handle with leather gloves. Wash with soap and water if skin contact.

> * Level D PPE is recommended.

> * Epoxy-Boron Truss

> * These materials should be in a solid minimum hazard state.

> * This material must be inhaled or ingested to exhibit toxic effects.

- > * Handle with leather gloves. Wash with soap and water if skin contact.
- > * Level D PPE is recommended.
- > * Beryllium
- > * Found in windshield frame and external tank doors
- > * Must be inhaled or ingested to be a hazard
- > * Should be found in a solid minimum hazard state.
- > * Handle with leather gloves. Wash with soap and water if skin contact.
- > * Level D PPE is recommended. If material is oxidized, PPE level upgrade should be considered.
- >
- > 1. Hypergolic Propellants
- >
- > Debris suspected of containing hypergolic propellants should be examined upwind at a distance. Items potentially containing liquids or vapors of hypergolic propellants would probably be tubing, thrusters, piping, tubing/piping fittings, and vessels. If hypergolic propellants are present, the debris may be approached by NASA/Contractor qualified personnel in Level A or equivalent. Calibrated monitoring equipment should be used to determine hypergolic vapor concentrations. If no hypergolic vapors are detected, the site health and safety supervisor may downgrade PPE taking into consideration the pH of the material.
- > Parts and materials contaminated with propellants that have been > "> bagged> "> may off-gas slowly in the bag or container used for storage and shipping. Caution should be used when opening bags known or suspected to have been contaminated with propellants. Open the bags under a laboratory fume hood, and/or with proper PPE.
- >
- > * Hydrazine, monomethyl hydrazine, and Nitrogen tetroxide (Hypergolic Propellants)
- > * Forward and Aft reaction control system (RCS), Auxiliary Power Unit (APU), and Orbiter Maneuvering System (OMS)>
- > * > Only NASA/Contractor qualified employees should enter areas with hypergolic propel> lants present in OSHA Level A Protection with suit/gloves made with hypergolic propellant protective /compatible materials or Propellant Handlers Ensemble (PHE), (SCAPE)
- > * Valves are designed to fail closed, assume all tubing to be contaminated with hypergolic propellant.
- > * Appropriate control zones should be established to prevent exposure to unprotected personnel. Vessels under pressure should also be taken into consideration while establishing the control zone.
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- > * 3. Cryogenics
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- > * Liquid Hydrogen (LH2) and Liquid Oxygen (LO2)
- > * Heavy leather gloves are appropriate PPE for handling.
- > * See on-site Health and Safety supervisor for site-specific recommendations.
- >
- > * 4. Refrigerants
- > * Ammonia
- > * - Orbiter coolant system. Ammonia vapors may be irritating to eyes and upper respiratory system.
- > * Utilize Level B (Self-contained breathing apparatus and skin protection) for

- unknown concentrations during initial characterization.
- > * Consult with on-site health and safety representative for appropriate PPE.
- > * Dichloromonofluoromethane (Freon 21)
- > * Orbiter coolant system. May displace oxygen in enclosed or poorly ventilated areas.
- > * Utilize Level B (Self-contained breathing apparatus and compatible gloves) in enclosed areas.
- > * Consult with on-site safety representative for appropriate PPE.
- >
- > 5. Thermal Protection System (TPS) Materials:
- > * Silica and other refractory fibers may be found in Shuttle tiles, blankets used on exterior Shuttle surfaces and payload bay, gap fillers, thermal barriers, heat shields.
- > * The principal acute hazards of TPS materials are eye, skin and upper respiratory (depending upon particle size) tract irritation. Irritation and abrasion, similar to that of glass fibers may occur.
- > * The level of PPE should be based on the task being performed, friability of the material and environmental conditions. Coordinate proper selection with site health and safety supervisor.
- >
- > 5. Helium Pressure Systems
- > * Forward and Aft Reaction Control System (RCS) 13 gallon helium tanks (6 tanks) and Orbiter Maneuvering System (OMS) 130 gal helium tanks (2 tanks)
- > * See site health and safety supervisor for safety precautions.
- >
- > 5. Ordnance
- > * Ordnance is located in the following areas of the Shuttle: Wheel well in main landing gear, Drag chute compartment, Main hatch, KU-Band Antenna, Emergency Egress Window, Fire extinguisher tanks
- > * See site health and safety supervisor for safety precautions.
- >
- > 5. Other Chemicals
- >
- > Recovery teams should remember that various sizes of pressurized vessels used for Shuttle experiments may be present in the debris. These vessels, although small, may be highly pressurized, and should be handled with care. Coordinate with health and safety supervisor.
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- > GENERAL RECOMMENDATIONS:
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- > 1. Appropriate decontamination procedures must be followed to prevent transport of dusty debris from the work area. Donning/ doffing PPE should be performed in a clean area. Procedure to be posted at site.
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- > 2. If debris is contaminated with carbon/graphite fibers (burned graphite/composite), personnel exiting a controlled zone should use a wet/dry HEPA vacuum (if present) to decontaminate outer clothing prior to removal. Procedure to be posted at site.
- >
- > 3. Contaminated PPE should be disposed of in appropriate bags/containers.
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> 4. Respirators should be wet wiped on the outside and wipes disposed of properly. Respirators may not be left in potentially contaminated areas. The inside of the respirator should not be exposed to composite materials. This could result in skin irritation around facial area. Additionally, gloves should not be left in potentially contaminated areas. Disposable respirators should be discarded in appropriate bags/containers. Follow normal respirator cleaning and disinfecting protocol.

>
> 5.> > Personnel should wash their hands and face when leaving a controlled work area and should wash their hands, forearms, and face prior to eating, drinking, or > smoking. Personnel should shower prior to going home when possible. Where possible a portable eyewash providing fifteen minutes of flow should be on site.

>
> 6. Respirator filters should be replaced whenever they are damaged, soiled, or causing noticeably increased breathing resistance (e.g., causing discomfort to the wearer). Use of protective clothing, including respiratory protection, must be used in accordance with the manufacturer's recommendations. Use of respiratory protection must be in accordance with 29 CFR 1910.134. If other respiratory protection such as organic vapor, ammonia, or other applications are needed consult with an industrial hygienist.

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